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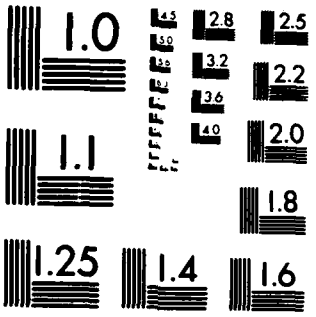

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UNIT REPLACEMENT SYSTEM ANALYSIS III (URSA III)

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PREPARED BY

FORCE SYSTEMS DIRECTORATE

US ARMY CONCEPTS ANALYSIS AGENCY

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The URSA III Study is to assist HQDA in transitioning from an individual to a unit replacement system. The assignment of combat arms battalions to regiments resulted in unequal career opportunities for soldiers serving in those positions. Combat arms positions in organizations other than the regimental battalions were not affiliated with any regiment. Using a sequential linear goal programing model the study distributed the extra-regimental CMF 11, 13 and 19 positions to equalize individual career opportunities.

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STUDY REPORT
CAA-SR-83-9

UNIT REPLACEMENT SYSTEM ANALYSIS III
(URSA III)

June 1983

Prepared by

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REPLY TO
ATTENTION OF

CSCA-FSP

29 June 1983

SUBJECT: Unit Replacement System Analysis III (URSA III)

Deputy Chief of Staff for Personnel
Department of the Army
ATTN: DAPE-ZXB
Washington, DC 20310

1. Reference.

a. Letter, DAPE-ZXB, subject: Study; Unit Replacement System Analysis III (URSA III), dated 19 November 1982.

b. Letter, DAPE-ZXB, subject: Change to Study - Unit Replacement System Analysis III (URSA III), dated 28 January 1983.

2. Attached is the final study report which, along with the data previously provided, fulfills the requirements set forth in references a and b above.

3. Your written evaluation of the study results, as required by paragraph 3-5.a, AR 5-5, will assist this Agency in continuing to provide quality analytical support.

David C. Hardison

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as

DAVID C. HARDISON
Director

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CAA	**UNIT REPLACEMENT SYSTEM ANALYSIS III (URSA III)**	**ONE SHEET STUDY GIST**

THE PRINCIPAL FINDINGS of the work reported herein are as follows:

(1) Personnel assets can be distributed to regiments so that differences in CONUS turnaround time and promotion opportunity are minimal. Differences between regiments in homebasing for individuals, opportunity to serve in TOE units, and short-tour equity will be substantial.

(2) The proposed company replacement cycles will have the effect of increasing personnel turbulence in TDA activities and TOE units above company level. Associated with this increase in turbulence is an increase in the number of annual PCS moves required.

(3) Individual soldiers will tend to PCS more frequently under the proposed system than under the current system.

(4) The regimental and unit replacement system will constrain force design, stationing, structuring, and manning decisions.

THE MAIN ASSUMPTIONS on which the work reported herein rests are as follows:

(1) The linking and pairing of units will be as briefed by ODCSOPS and approved by CSA.

(2) The authorization data provided by the proponent is accurate. The Army will be manned to that authorization.

(3) The system is operating in a steady-state, peacetime condition and will not be subjected to major dislocations such as restationing of units and unit activations or inactivations.

THE PRINCIPAL LIMITATIONS of this work which may affect the findings are as follows:

(1) The study did not address questions concerning the effect of the regimental and unit replacment system on the cohesion, readiness, or capability of the units involved.

(2) Only high density combat arms MOSs were considered; questions concerning combat support and combat service support personnel were not addressed.

(3) The methodology employed was deterministic and ignores many manning functions and interactions; for example, transitioning between primary and secondary MOSs was not considered.

(4) Airborne regiments were not included in the analysis because of their unique requirements and geographic distribution.

THE SCOPE OF THE STUDY The study included proposed infantry, armor, and field artillery regiments with personnel allocations developed using FY 83 and FY 86 authorization data.

THE STUDY OBJECTIVES were to:

(1) Develop a methodology to distribute spaces to regiments to best meet goals of equitable career opportunity.

(2) Analyze the resulting allocation for impact of regimental structure and unit replacement plan on individual soldiers, impact of structure and unit replacement on units and activities, and identify costs and potential problem areas.

THE BASIC APPROACH followed in this study was to formulate and prioritize goals. Then a sequential linear goal programing model was developed to distribute personnel spaces to best meet the prioritized goals. This allocation was then analyzed to determine system and individual effects.

THE REASON FOR PERFORMING THE STUDY was to assist in the transition from the current individual replacement system to a regimental system with unit replacement.

THE STUDY SPONSOR was the Manning Task Force, ODCSPER.

THE STUDY EFFORT was directed by MAJ C. B. Torres, Force Systems Directorate.

COMMENTS AND QUESTIONS may be directed to CAA, ATTN: Assistant Director for Force Systems (CSCA-FS).

Tear-out copies of this synopsis are at back cover.

CONTENTS

CHAPTER		Page
1	INTRODUCTION	1-1
2	STUDY METHODOLOGY	2-1
	Introduction	2-1
	Problem	2-1
	Approach	2-1
	Goals and Constraints	2-1
	Goal Satisfaction	2-3
	Sensitivity to Goal Prioritization	2-9
	Summary	2-11
3	STUDY RESULTS	3-1
	Introduction	3-1
	Personnel Authorization	3-1
	Typical Career Pattern	3-3
	Sources and Destination	3-5
	PCS Requirements	3-6
4	OBSERVATIONS	4-1
	Purpose	4-1
	Observation - Sensitivity to Force Structure Decisions	4-1
	Observation - Manning the Regiment	4-2
	Observation - Effect of Unit Replacement Cycles	4-2
	Observation - Individual Homebasing	4-4

APPENDIX		
A	Study Contributors	A-1
B	Study Directive	B-1
C	Detailed Methodology	C-1
D	Allocation Report	D-1

GIST

FIGURES

FIGURE		Page
1-1	Typical Personnel Flow.....	1-1
2-1	CONUS Turnaround Time, Grade E5.....	2-5
2-2	CONUS Turnaround Time, Grade E6.....	2-5
2-3	Forced Transfers.....	2-6
2-4	Unit Tour Opportunity, Grade E5.....	2-8
2-5	Short-tour Opportunity, Grade E5.....	2-8
2-6	Regimental Size.....	2-9
3-1	Typical Career Pattern, MOS 11B.....	3-4
3-2	Typical Sources and Destinations.....	3-6
4-1	Individual Replacement Flow Pattern.....	4-3
4-2	Unit Replacement Flow Pattern.....	4-4
C-1	Regimental Flow Diagram - Rotational Unit.....	C-5
C-2	Regimental Flow Diagram - Nonrotational Unit.....	C-6
C-3	Regimental Flow Diagram - Rotational Unit's Homebase Components.....	C-7
C-4	Basic Flow Model.....	C-11
C-5	Turnaround Time Goal.....	C-12
C-6	Promotion Opportunity Goal.....	C-13

TABLES

TABLE		
2-1	Space Allocation Goals.....	2-2
2-2	Percentage of MOS 11B Regimental Positions at the Homebase (after allocation).....	2-6
2-3	Sensitivity to Priority Order.....	2-9
3-1	Authorized CMF 11 Positions.....	3-2
3-2	Authorized CMF 13 Positions.....	3-2
3-3	Authorized CMF 19 Positions.....	3-3
3-4	Career Pattern Summary, MOS 11B.....	3-4
3-5	PCS Impacts.....	3-7
4-1	Effect of Battalion Deactivation.....	4-2
4-2	Individual Homebasing Comparison.....	4-5
C-1	Profit Coefficients for CMF 11.....	C-15

TABLE

		Page
D-1	Distribution Summary, Grade E3, MOS 11B, FY 86.....	D-3
D-2	Distribution Summary, Grade E4, MOS 11B, FY 86.....	D-4
D-2	Distribution Summary, Grade E5, MOS 11B, FY 86.....	D-5
D-4	Distribution Summary, Grade E6, MOS 11B, FY 86.....	D-6
D-5	Distribution Summary, Grade E7, MOS 11B, FY 86.....	D-7
D-6	Distribution Summary, Grade E8, MOS 11B, FY 86.....	D-8
D-7	Distribution Summary by Location Percentage, Grade E3, MOS 11B, FY 86.....	D-10
D-8	Distribution Summary by Location Percentage, Grade E4, MOS 11B, FY 86.....	D-11
D-9	Distribution Summary by Location Percentage, Grade E5, MOS 11B, FY 86.....	D-12
D-10	Distribution Summary by Location Percentage, Grade E6, MOS 11B, FY 86.....	D-13
D-11	Distribution Summary by Location Percentage, Grade E7, MOS 11B, FY 86.....	D-14
D-12	Distribution Summary by Location Percentage, Grade E8, MOS 11B, FY 86.....	D-15
D-13	Distribution Summary by System Percentage, Grade E3, MOS 11B, FY 86.....	D-17
D-14	Distribution Summary by System Percentage, Grade E4, MOS 11B, FY 86.....	D-18
D-15	Distribution Summary by System Percentage, Grade E5, MOS 11B, FY 86.....	D-19
D-16	Distribution Summary by System Percentage, Grade E6, MOS 11B, FY 86.....	D-20
D-17	Distribution Summary by System Percentage, Grade E7, MOS 11B, FY 86.....	D-21
D-18	Distribution Summary by System Percentage, Grade E8, MOS 11B, FY 86.....	D-22

CHAPTER 1

INTRODUCTION

1-1. STUDY PURPOSE. The Unit Replacement System Analysis III (URSA III) Study was initiated to assist the Office of the Deputy Chief of Staff for Personnel (ODCSPER) Manning Task Force in implementing the transition from the current system of individual replacement to a regimental system with unit replacement.

1-2. BACKGROUND

a. Shown in Figure 1-1 is the long-tour unit replacement cycle flow pattern for personnel in a typical mechanized regiment. Under this concept, personnel affiliated with the regiment are drawn to the regimental homebase from extraregimental positions (denoted by the circles) to form a replacement unit. This unit then spends 18 months in CONUS and 18 months overseas. At the end of the 36-month period, the unit is disestablished and its personnel are individually reassigned. First-term soldiers and unaccompanied careerists are returned to CONUS; accompanied careerists are reassigned within the overseas theater. The personnel involved retain their regimental affiliation throughout this process. The concept for short-tour regiments is similar, except that the unit replacement cycle consists of 24 months in CONUS followed by 12 months overseas, with individual reassignment of all personnel to CONUS at the end of the cycle.

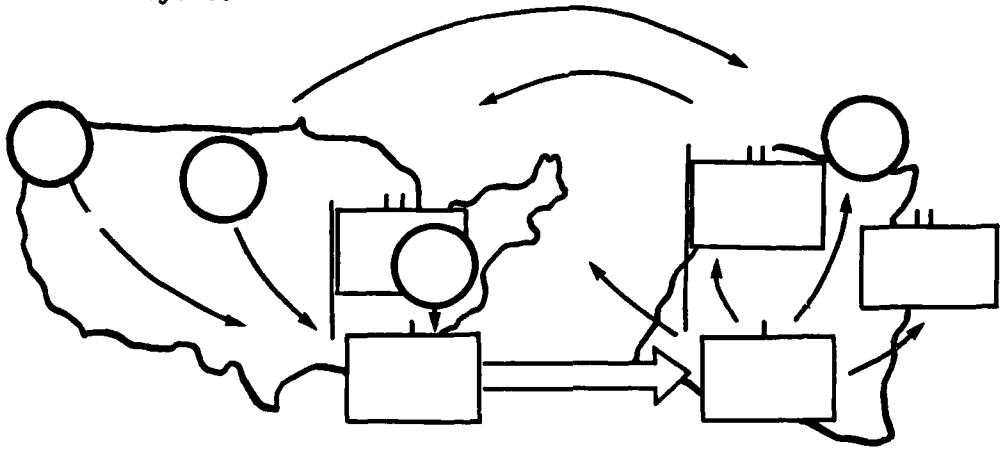


Figure 1-1. Typical Personnel Flow

b. As initially tasked, the URSA III Study was to consist of two essentially separate analyses and was to be conducted in two phases. The first task of the study was to develop a model to distribute extraregimental (ERA) spaces to the regiments as linked and paired by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), while the second phase was to investigate the initial fill requirement for replacement companies under several conditions. (See Section I, Appendix B.)

c. During the model development effort in Phase I of the study, it became apparent that analysis of the results of the space allocation model would yield insights of far greater utility than initially thought. With the concurrence of the study proponent, the study effort was restructured to emphasize the space allocation analysis.

d. The initial tasking directive required that space allocations be developed for five branches--Infantry, Armor, Field Artillery, Air Defense Artillery, and Engineer--based on the authorization data for the FY 86 force. In late January, the proponent requested that air defense and engineer regiments be dropped from the space allocation effort, and that an additional allocation be developed for infantry, armor, and field artillery regiments based on authorization data for the FY 83 force. The proponent also decided to drop the requirements in the initial tasking directive concerning the initial fill analysis. (See Section II, Appendix B.)

e. The remainder of this report, then, incorporates discussions of methodology, results, and observations limited to the scope of the study as it evolved.

1-3. THE PROBLEM. A total personnel authorization for each regiment is needed to provide a target in the affiliation process. The ODCSOPS action of linking and pairing units fixed the table of organization and equipment (TOE) portion of the personnel authorization; the remaining personnel spaces in table of distribution and allowances (TDA) activities, in TOE units above battalion, and those in battalions not a part of the regimental structure comprise the ERA spaces to be distributed to regiments to form the total personnel authorization.

1-4. OBJECTIVES

a. Develop and exercise methodology to distribute ERA spaces to regiments so that personnel of the same grade and military occupational specialty (MOS) would have similar career experiences regardless of regimental affiliation.

b. Analyze the resulting personnel space allocation to determine the impact on individual soldiers and units in the system, and to ascertain the cost increases and potential problem areas associated with the proposed regimental structure and unit replacement plan.

1-5. SCOPE. Personnel space allocations were developed for infantry, armor, and field artillery regiments using authorization data for FY 83 and FY 86.

1-6. LIMITATIONS

a. The study did not address questions concerning the effect of the regimental and unit replcement system on the cohesion, readiness, or capability of the units involved.

b. Only high density combat arms MOSs were considered; questions concerning combat support and combat service support personnel were not addressed.

c. The methodology employed was deterministic and ignores many manning functions and interactions; for example, transitioning between primary and secondary MOSs was not considered.

d. Airborne regiments were not included in the analysis because of their unique requirements and geographic distribution.

1-7. ASSUMPTIONS

a. Replacement units are line companies.

b. The unit long-tour cycle will consist of 18 months in CONUS followed by 18 months OCONUS (18/18).

c. The unit short-tour cycle will consist of 24 months in CONUS followed by 12 months OCONUS (24/12).

d. Regiments will be as designated by ODCSOPS.

1-8. ESSENTIAL ELEMENTS OF ANALYSIS (EEA)

a. What should the CMF 11, 13, and 19 personnel authorizations be by grade and MOS for each designated regiment?

b. Describe the typical career pattern of a soldier in each CMF.

c. Where (in terms of theater and type assignment) do departing soldiers go at critical points in the unit cycle; and where do incoming soldiers originate (by grade and MOS)?

d. What is the expected PCS cost?

1-9. CONTENTS OF THE REPORT. The subsequent chapters, supported by appendices, present the study results. Chapter 2 contains general description of the methodology employed; Chapter 3 presents study results which are keyed to the EEA and Chapter 4 consists of observations not directly related to the EEA. A detailed discusssion of the methodology employed is at Appendix C, and a sample of detailed allocation data delivered to the proponent is at Appendix D.

CHAPTER 2

METHODOLOGY

2-1. INTRODUCTION. The purpose of this chapter is to provide a general description of the methodology employed in the URSA III Study. This description is focused on the model employed, the degree to which stated goals were satisfied by the model, and the sensitivity of solutions to variations in goal prioritization.

2-2. PROBLEM

a. The ODCSOPS actions of linking and pairing established the basic structure of each regiment and fixed a part of each regiment's personnel authorization; that is, the number of TOE positions in each of the component battalions. This action did not, however, distribute any of the TDA or TOE spaces above battalion level.

b. The problem, then, was to distribute the remaining (TDA and TOE-above-battalion) spaces to regiments so as to minimize the differences which would be experienced by soldiers of the same grade and MOS who were affiliated with different regiments.

2-3. APPROACH

a. The approach selected was to use sequential linear goal programming to allocate the available (TDA and TOE-above-battalion) spaces to regiments. Using this approach, the goals were formulated as achievement functions. The achievement functions typically consisted of a set of deviation variables, the sum of which was to be minimized.

b. In this model, the importance of goals is preemptive--that is, the weight attached to obtaining the best possible solution to the highest priority goal is infinitely more important than that attached to the second. Similarly, the second priority goal is infinitely more important than the third, etc. Because of this, the optimal value of each higher priority achievement function is imposed as a constraint on subsequent optimizations.

2-4. GOALS AND CONSTRAINTS

a. The goals and priorities shown in Table 2-1 were developed in conjunction with the study sponsor.

Table 2-1. Space Allocation Goals

Goal	Priority
Individuals have same CONUS turnaround time	1
Individuals have same promotion opportunity	2
Best geographic distribution	3
Equal chance to have unit assignment	4
Equal chance of short-tour assignment	5
Equal size regiments (to facilitate management)	6

(1) The highest priority goal was that personnel of the same grade and MOS should have an equal interval between overseas tours regardless of regimental affiliation. In satisfying this goal, the model would attempt to allocate CONUS spaces to those regiments which were initially OCONUS heavy, and OCONUS spaces to those which had an overage in their CONUS sustaining bases.

(2) The promotion opportunity goal attempts to distribute available spaces so that every regiment has a similar grade distribution pyramid.

(3) The geographic distribution goal was formulated as a maximization function in which a profit was asssociated with each location and regiment combination. Maximum profit was associated with the allocation of spaces at a CONUS installation to regiments which were homebased there. Similarly, maximum profit was associated with allocation of OCONUS spaces to appropriate regiments, i.e., spaces in Germany to those regiments which had their OCONUS components there. Other location and regiment combinations were awarded points on a diminishing scale.

(4) The unit opportunity function attempts to achieve the same ratio of TDA and TOE-above-battalion spaces to battalion TOE spaces for each regiment.

(5) The short-tour opportunity function seeks to achieve the same ratio of spaces in short-tour areas to total spaces for each regiment.

(6) The equal size function attempts to make regiments have an equal number of spaces for each grade and MOS.

b. In addition to the goals, or achievement functions, shown above, certain constraints were also operative:

(1) The model was required to distribute all of the available spaces.

(2) In order to reflect the unit replacement cycles, the model distributed CONUS and OCONUS spaces to accommodate the flow into and out of replacement units on a fair share basis.

2-5. GOAL SATISFACTION

a. General

(1) In a perfect world, there would be sufficient assets (available personnel spaces) so that each of the goals would be fully satisfied for every MOS, grade, and regiment combination. In the real world, however, there are not sufficient assets for this to happen, and even an optimal distribution may have variance between regiments. This is particularly true if the regiments have uneven initial characteristics, if the MOS under consideration has relatively few assets (available spaces) for distribution, or if the goal being satisfied is of a low priority.

(2) Shown below are examples of the degree to which the various goals were satisfied for MOS 11B using FY 86 data. The goals were satisfied for other MOSs to a similar degree.

b. CONUS Turnaround Time (Priority 1)

(1) Figure 2-1 shows the distribution of CONUS turnaround time for E5s before and after the allocation of available spaces. The variation between regiments in their initial condition is substantial; after the allocation, the regiments are clustered very closely about the goal, 2.1 years. This clustering is achieved even though only about 15 percent of the total E5 spaces are available for distribution.

(2) Figure 2-2 illustrates the before and after condition for grade E6 and is typical of the higher NCO grades. This virtually exact clustering can be achieved because in the higher grades well over 50 percent of the total spaces are available for allocation.

c. Promotion Equity (Priority 2)

(1) The current NCO promotion system is centralized in order to promote the number of soldiers required to fill anticipated shortages. If each regiment had a grade structure pyramid which was exactly proportional to the pyramid for the entire MOS, then each would produce through promotion exactly what was required at the next higher grade.

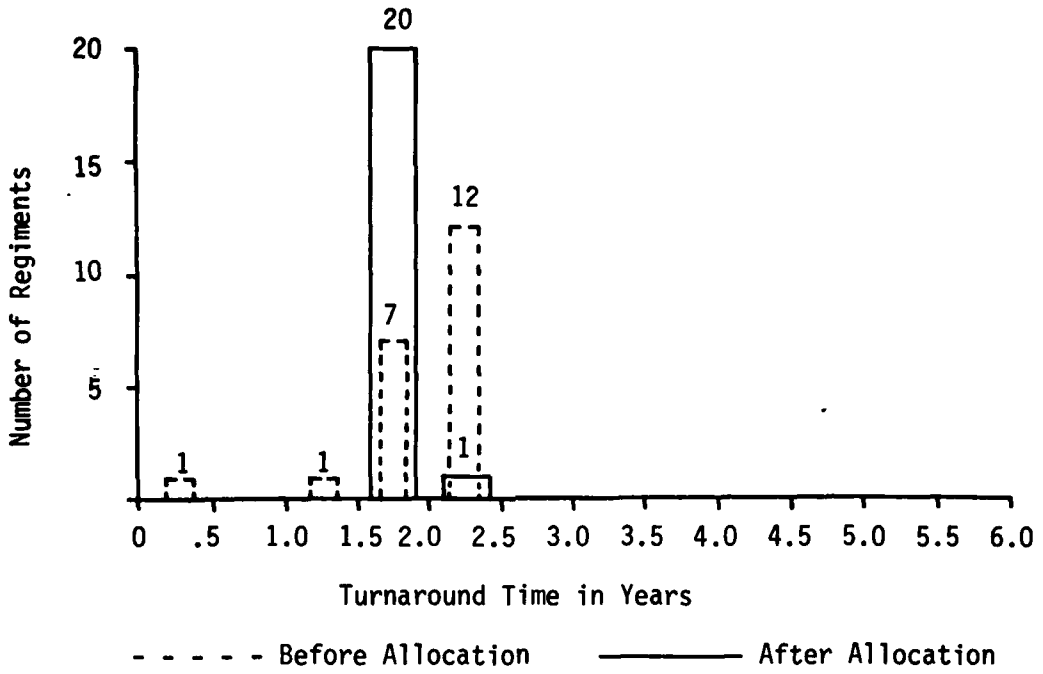


Figure 2-1. CONUS Turnaround Time, Grade E5

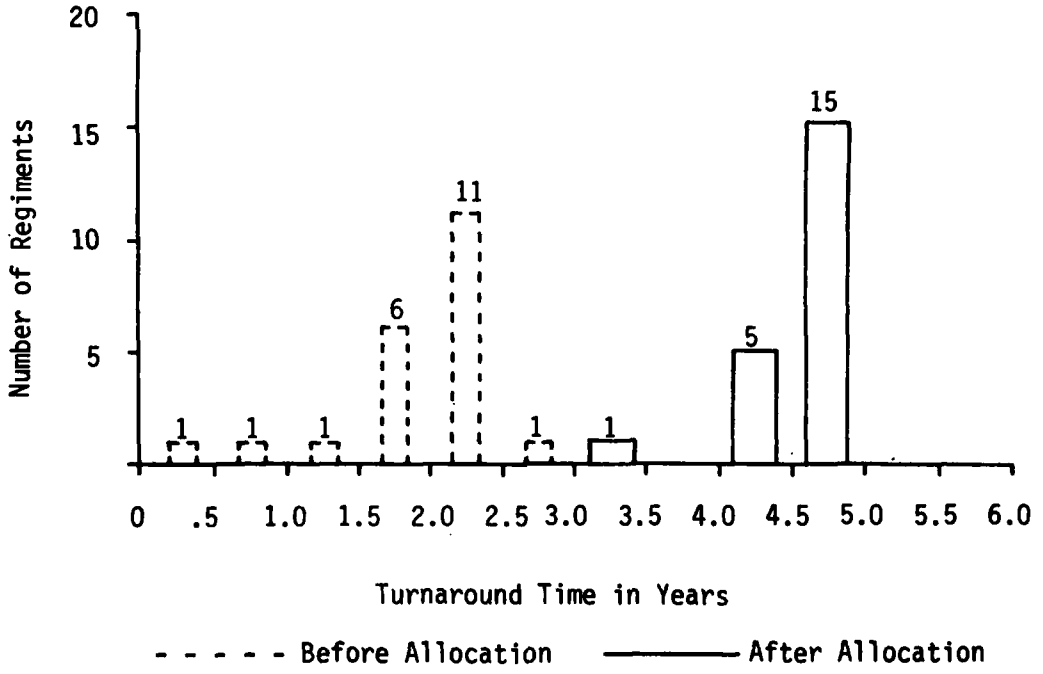
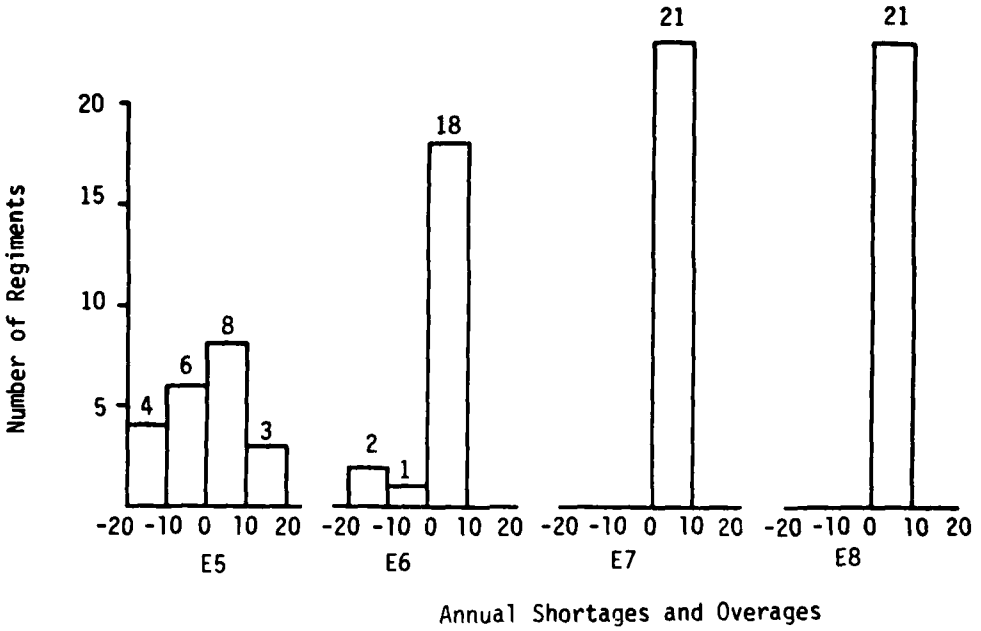


Figure 2-2. CONUS Turnaround Time, Grade E6

(2) Regiments whose grade structure differs from that of the entire MOS will either have too many or too few soldiers promoted. Figure 2-3 illustrates the number of regiments which are "over- or under-promoters," and the number of shortages or overages which would result from centralized promotion. This is the total number of personnel who would have to be reaffiliated or transferred to other regiments as a result of promotion on an annual basis.



Total Shortages & Overages:	E5 71	E6 28	E7 0	E8 0

Figure 2-3. Forced Transfers

d. Geographic Correctness (Priority 3)

(1) One index of the geographic correctness of the allocation is the evenness or unevenness of the proportion of total positions at the homebase.

(2) As shown by Table 2-2, there is substantial disparity in each regiment's fraction of homebase to total CONUS positions. This disparity reflects the distribution of positions at CONUS installations; no significant improvement can be made in this area.

Table 2-2. Percentage of MOS 11B Regimental Positions at the Homebase (after allocation)

Regiment	Grade			
	E5	E6	E7	E8
41st Inf	85	54	56	55
18th Inf	43	90	93	93
16th Inf	84	41	51	100
5th Cav	100	56	54	38
8th Inf	85	38	31	40
12th Inf	85	38	33	40
6th Inf	85	38	34	42
52d Inf	46	20	18	24
4th Inf	84	32	30	37
15th Inf	43	14	13	16
7th Inf	100	100	100	100
5th Inf	13	4	5	8
327th Inf	100	57	32	33
187th Inf	100	49	28	31
502d Inf	100	43	26	45
23d Inf	100	58	46	37
1st Inf	100	57	44	100
9th Inf	100	50	38	37
17th Inf	100	50	38	73
2d Inf	100	58	44	42
21st Inf	100	47	35	41

e. Unit Tour Opportunity (Priority 4)

(1) Perfect satisfaction of the unit tour opportunity goal would result in each regiment having exactly the same ratio of TDA and TOE-above-battalion spaces.

(2) Figure 2-4 shows that there is a substantial difference between regiments in the ratio of extraregimental to unit spaces. This disparity is basically the same for every grade, and results from the conflict between this and the preceding higher priority goals.

f. Short Tour Opportunity (Priority 5)

(1) Figure 2-5 illustrates the number of regiments which have a given fraction of short-tour spaces to total spaces for grade E5. Of the 21 regiments, 16 have fewer than 10 percent of their strength in short-tour areas, while the remaining 5 have at least double that fraction. This distribution is similar at every grade.

Figure 2-4. Unit Tour Opportunity, Grade E5

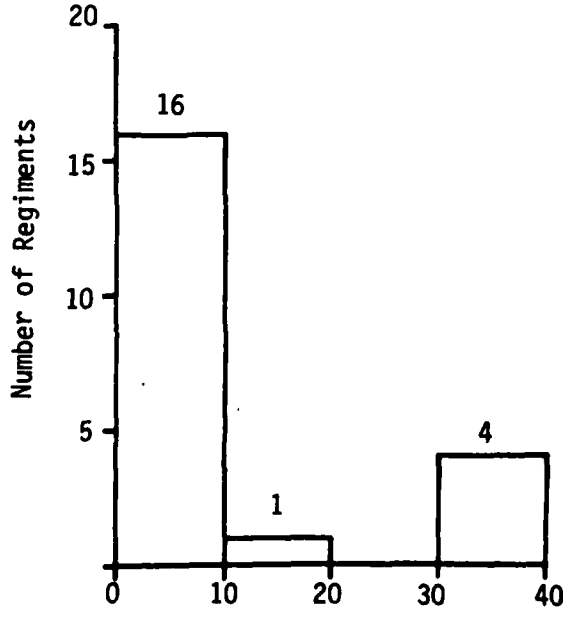


Figure 2-5. Short Tour Opportunity, Grade E5

(2) This disparity results from two causes; first, the decision to group units into regiments in a basically "long-tour regiment," "short-tour regiment" fashion, and secondly, the scarcity of positions outside units in short-tour areas.

g. Regimental Size (Priority 6)

(1) Figure 2-6 illustrates the variation in total strength of the regiments after allocation and shows a considerable disparity.

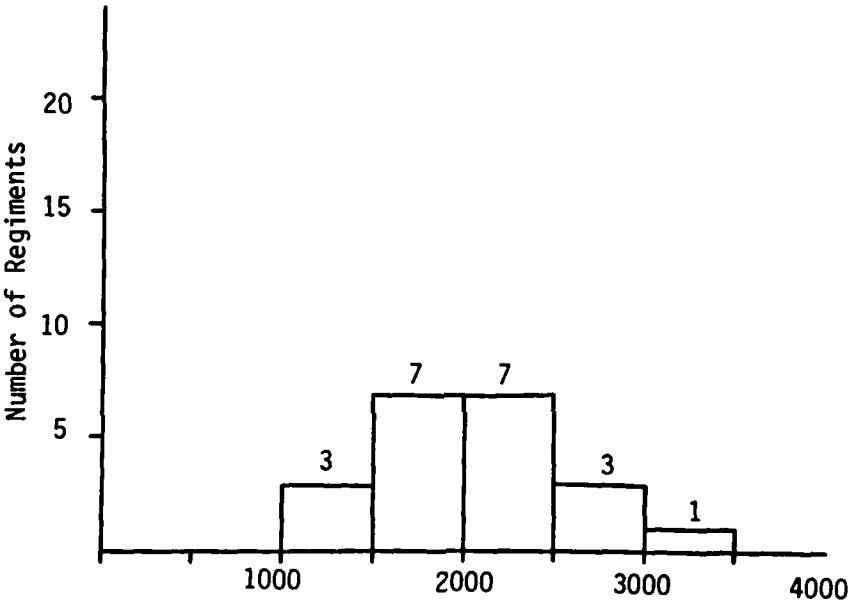


Figure 2-6. Regimental Size

(2) The disparity illustrated results from both a very uneven initial condition of the regiments (the number of assigned battalions varies from three to five) and the use of the available assets to satisfy higher priority goals.

2-6. SENSITIVITY TO GOAL PRIORITIZATION

a. As described above, the space allocation was accomplished by sequential linear goal progaming, and the lower priority goals could only be satisfied insofar as they did not reduce the achievement of any higher priority goal. As would be expected, then, the degree to which a goal could be satisfied was sensitive to its priority and the order in which higher priority goals were satisfied.

b. Table 2-3 was derived by determining the optimal value for each achievement function as though it had the highest priority. This represents the maximum degree to which that particular goal can be satisfied. The order of the first three priority goals was then varied to determine the change which would occur in that prioritization. The first column represents the base case order; in the second, geographic correctness and promotion opportunity have changed places.

Table 2-3. Sensitivity to Priority Order

Goal	Priority order					
	T-P-G	T-G-P	P-T-G	P-G-T	G-P-T	G-T-P
Turnaround time (T)	0	0	150	268	256	160
Promotion opportunity (P)	42	105	0	0	56	71
Geographic correctness (G)	14	4	13	11	0	0
Unit opportunity	311	489	385	381	460	464
Short-tour opportunity	25	30	25	26	29	29
Regimental size	49	75	60	59	70	75
	(percent deviation from optimal achievement value)					

c. In the base case, turnaround time represents the highest priority. Its deviation from the best possible goal satisfaction was zero. Promotion opportunity was degraded by 42 percent while geographic correctness was degraded by 14 percent.

d. If the first three priorities were geographic correctness, promotion opportunity, and turnaround time, the results shown in column 5 would result. In this case, geographic correctness is at its best value while turnaround time is degraded by 256 percent and promotion opportunity by 56 percent.

e. The large degradation in the achievement of the unit tour goal in all cases shows that it conflicts with the first three priority goals.

f. The relative stability of the short-tour goal illustrates that little can be done to influence it.

2-7. SUMMARY. For each MOS under consideration, the methodology employed produces an allocation of personnel which satisfies the turnaround time and promotion opportunity goals very well; other, lower priority goals are satisfied to a substantially lesser degree.

CHAPTER 3

STUDY RESULTS

3-1. INTRODUCTION

a. The purpose of this chapter is to present study results which are directly related to the essential elements of analysis (EEA). The EEA are:

(1) What is the personnel authorization for each regiment?

(2) What is a typical career pattern for personnel in each type regiment?

(3) Where, in terms of theater and type assignment, do personnel originate and go at critical points in the unit replacement cycle?

(4) What is the expected change in PCS cost?

b. Succeeding paragraphs present the study findings concerning each EEA.

3-2. EEA 1 - PERSONNEL AUTHORIZATIONS

a. Data Development. Detailed personnel authorizations were developed using the methodology described in Chapter 2 for infantry, armor/cavalry, and field artillery regiments using both FY 83 and FY 86 authorization data. An example of the detailed data is at Appendix D; the same type data was provided to the study proponent for each MOS and is available on request. While this detailed data is omitted from this report, some general comments concerning the authorization for regiments in each CMF are given below.

b. CMF 11

(1) Shown in Table 3-1 is general information concerning the personnel space allocation for CMF 11.

(2) Space allocations were developed for 21 infantry regiments; the three airborne regiments were considered to be a special case to be treated at some later time. The airborne spaces were stripped from both the FY 83 and FY 86 data.

(3) Three infantry MOS were treated: 11B, 11C, and 11H. MOS 11M was treated as part of MOS 11B.

Table 3-1. Authorized CMF 11 Positions

Spaces	FY 83	FY 86
Total Army	67,224	57,140
Available to be allocated	26,224	13,561

c. CMF 13. (See Table 3-2.)

Table 3-2. Authorized CMF 13 Positions

Spaces	FY 83	FY 86
Total Army	33,683	38,868
Available to be allocated	9,790	11,576

(1) CMF 13 positions were distributed among the 15 cannon, 2 LANCE, and 1 PERSHING regiments.

(2) Because of the multiplicity of MOSs in CMF 13 and unit types in field artillery regiments, units and MOSs were typed as either cannon or missile, and the allocation was then made on this basis:

Type regiment	MOS
Cannon	13B, 13C, 13E, 13F
Missile	13M, 15D, 15E, 15J
Common to both	82C, 13W, 13Y

(3) For the FY 86 case, MOS 13M and 15D were merged, and the 13M positions in cannon regiments were considered extraregimental positions to be distributed to the missile regiments.

d. CMF 19. (See Table 3-3.)

Table 3-3. CMF 19 Allocation Data

Spaces	FY 83	FY 86
Total Army	27,463	27,341
Available to be allocated	8,527	8,302

(1) The available CMF 19 personnel spaces were distributed over 12 armor and 6 cavalry regiments.

(2) Four CMF 19 MOS were treated: 19D, 19E, 19K, and 19Z. MOS 19E and 19K were combined for both the FY 83 and FY 86 cases.

(3) The allocation of MOS 19E and 19K spaces was accomplished for two conditions: first, considering that those spaces organic to cavalry units belonged to the cavalry regiment and that cavalry regiments were competitors for the remaining available spaces; and second, considering that the 19E and 19K positions organic to cavalry regiments were extra-regimental and available for distribution only to the 12 armor regiments.

(4) Analysis of the two allocations revealed substantial differences in CONUS turnaround time in the first case; for that reason, the second method was selected as the base case.

3-3. EEA 2 - TYPICAL CAREER PATTERN

a. Figure 3-1 depicts a typical career pattern for a soldier affiliated with a mechanized infantry regiment which has its overseas component in Germany.

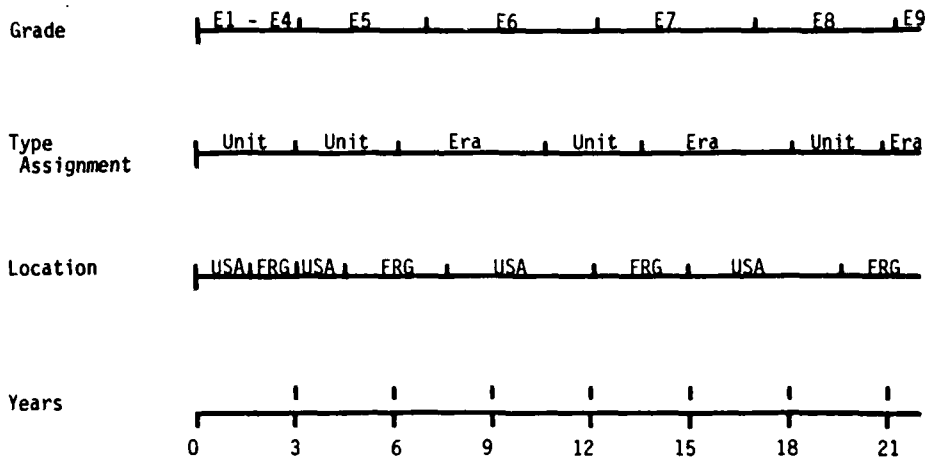


Figure 3-1. Typical Career Pattern, MOS 11B

b. Table 3-4 summarizes the data presented in Figure 3-1.

Table 3-4. Career Pattern Summary, MOS 11B

Grade	Yrs in grade	Yrs in unit	Yrs in ERA	Yrs in CONUS	Yrs in FRG	No of PCS
E1-E4	3	3	0	1.5	1.5	3
E5	4	3	1	1.5	2.5	2
E6	5.4	1.6	3.8	4.6	0.8	3
E7	4.8	1.4	3.4	2	2.8	2
E8	4.4	2.9	1.5	2.9	1.5	3
Total	21.6	11.9	9.7	12.5	9.1	13

(1) Because the preponderance of spaces for personnel in grades E5 and below is in TOE companies, the soldier's early career pattern is driven by the 18/18 unit replacement cycle. As he progresses in grade, the balance between ERA and unit assignments is reversed, the individual begins to have more time in ERA assignments, and fewer PCS moves over time are experienced.

(2) Soldiers in light infantry regiments operating on a 24/12 unit replacement cycle would experience basically the same pattern; however, their early years would reflect the 2:1 CONUS to OCONUS ratio mandated by the short-tour cycle, and they would spend somewhat more time in CONUS with slightly fewer PCS moves.

c. The typical career patterns for soldiers in CMF 13 and CMF 19 are virtually identical to the pattern for MOS 11B. This is to be expected, since the distribution of spaces between ERA and units is similar and since the unit rotation cycle is identical.

d. The typical career pattern presented is for an "ideal" soldier; that is, one whose promotion and assignment pattern coincides exactly with all expected values. Since most individuals will not exactly meet the averages, individual careers may differ substantially.

3-4. EEA 3 - SOURCES AND DESTINATIONS

a. The sources and destinations for soldiers at the beginning and end of the unit replacement cycle vary greatly from regiment to regiment depending on the availability of extraregimental positions at the homebase and the availability of positions in the OCONUS area. Some generalizations, however, can be made which are true of every MOS.

(1) Regiments which are homebased at school posts (Fort Benning for infantry, Fort Knox for armor, Fort Sill for artillery) will be able to satisfy their requirements for NCOs from assets at that installation. Other regiments will have to draw on other CONUS installations to meet their needs.

(2) There are insufficient positions for soldiers in grade E5 in long-tour areas to accommodate the output of replacement companies as they reach the end of their cycles. For grade E6 and above, there is no problem in this area.

b. Figure 3-2 depicts the sources and destinations of soldiers joining and departing replacement companies of the 16th Infantry at the beginning and end of the replacement cycle. This regiment is typical of mechanized regiments homebased at divisional posts in CONUS.

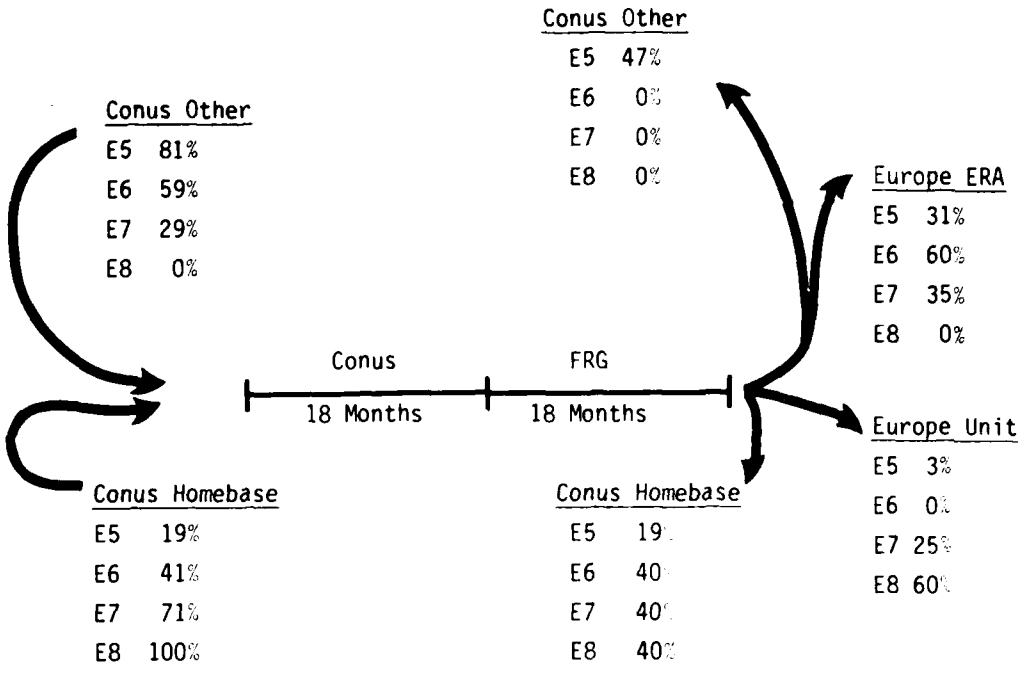


Figure 3-2. Typical Sources and Destinations

(1) A large proportion of the NCOs in grades E5 and E6 required to form a replacement company must be drawn from other CONUS installations. This results in an increase in the requirement for CONUS to CONUS PCS movement.

(2) Only 34 percent of personnel in grade E5 can be retained in Europe when the company is dissolved; the target is to retain 60 percent. The early return of these soldiers causes an increase in the CONUS to Europe PCS requirement.

3-5. EEA 4 - PCS REQUIREMENT

a. Table 3-5 depicts the annual number of PCS moves and the cost of these moves for NCO grades E5 through E8.

Table 3-5. PCS Impact

Policy	CONUS to CONUS	CONUS to long tour[a]	Long tour to long tour	CONUS to short tour[a]	Total	$ Cost[b]
Individual replacement	0	16,720	0	6,512	23,232	45.1M
Company replacement	3,555	18,614	998	6,512	29,679	54.5M

[a]Includes return PCS.

[b]Based on FCIS FY 81 cost per PCS per individual.

(1) In deriving this chart, it was assumed that under an ideal system of individual replacement, there would be no requirement for intra-CONUS or intratheater PCS moves.

(2) In the company replacement case, only transitions from a unit to an extraregimental assignment were counted as a PCS.

(3) The PCS requirement for grades E1-E4 was considered to be roughly equal under both policies and was not included.

b. The difference in the annual PCS requirement occurs in three categories: intra-CONUS moves, intratheater moves in long-tour areas, and CONUS to long-tour theater and return moves.

(1) The increase in intra-CONUS moves is due to the fact that most regiments do not have sufficient assets at the homebase to fill replacement companies at start-up; the shortage must be drawn from other CONUS installations.

(2) The increase in intratheater moves results from the requirement to find spaces for 60 percent of NCOs at the end of the unit cycle. Most regiments cannot accommodate this outflow in TOE positions, and PCS moves result.

(3) The increase in CONUS to long-tour area and return moves is principally attributable to the inability of the system to accommodate the outflow of E5s from replacement units. Typically, 20 to 30 percent of E5s leaving replacement units must be returned to CONUS prematurely.

CHAPTER 4

OBSERVATIONS

4-1. PURPOSE. The purpose of this chapter is to present observations which, while not directly related to the essental elements of analysis, are of significance in the process of transitioning to a regimental system with unit replacement.

4-2. OBSERVATION - SENSITIVITY TO FORCE STRUCTURE DECISIONS

a. Partitioning the Army into regiments and implementing a unit replacement plan will constrain changes in the areas of force design, stationing, and structuring. If decisions in these areas do not take regimental linkings and pairings into consideration, personnel in the system will be adversely affected.

b. As an example, consider the effect of a decision to deactivate a mechanized battalion in Europe after affiliation of personnel has been accomplished. In this case, the personnel authorization for the 8th Infantry Regiment was developed for a two-CONUS, three-Europe battalion configuration. After affiliation of the MOS has been completed, one European battalion is deactivated. The number of authorized positions decreases while the number of soldiers remains unchanged. Due to the new CONUS/OCONUS balance and the new grade structure the career opportunities of the regiment's soldiers change.

c. Table 4-1 illustrates two of the impacts of such a decision. Over 100 NCOs would have to be reaffiliated to other regiments, and the remaining personnel in the 8th Infantry would enjoy a substantially longer CONUS turnaround time than their counterparts in other infantry regiments.

d. If the changes in career opportunities to the 8th Infantry's soldiers are unacceptable each affected MOS would require reallocation to rebalance the regiments.

Table 4-1. Effect of Battalion Deactivation

If Regiment was Manned to Base Case Authorization				
Excess personnel		Change in turnaround time (yrs)		
			Old	New
E5	78	E5	1.87	2.91
E6	36	E6	4.76	6.28
E7	15	E7	5.86	7.79
E8	8	E8	4.59	5.92

4-3. OBSERVATION - MANNING THE REGIMENTS

a. If regiments are manned to the authorizations developed in this study, then personnel of a grade and MOS can expect reasonably equal CONUS turnaround times and promotion opportunities regardless of their regimental affiliation. If there is a variance between the actual inventory of personnel and the total authorization, the system will remain equitable so long as the overages and shortages are shared equally by all regiments. Overmanning some regiments at the expense of others will produce significant inequity.

b. Another policy which may produce inequity is that of "fencing"; that is, stabilizing certain positions for 3- or 4-year periods. If the expected CONUS turnaround time for a grade and MOS exceeds the stabilization period, then fencing has no adverse impact. If, however, the stabilization period exceeds the expected CONUS stay time, then personnel who occupy nonfenced positions will experience a reduction in their CONUS tour length.

4-4. OBSERVATION - EFFECT OF UNIT REPLACEMENT CYCLES

a. The 18/18 and 24/12 unit replacement cycles will stabilize replacement units but will have a destablizing effect on TDA activities and TOE units above company level, and on individuals serving in these positions. There will also be a substantial increase in the annual number of PCS moves required to support the system.

b. The increase in the annual PCS requirement is discussed in detail in Chapter 3. The remainder of this observation will focus on the turbulence which will be experienced by other than replacement units and activities.

c. Figure 4-1 illustrates the distribution and flow pattern of MOS 11B grade E6 personnel in the 16th Infantry operating under an individual replacement system. Based on an expected distribution of 60 percent accompanied and 40 percent unaccompanied personnel, the stay time in Europe is 2.4 years and the corresponding CONUS turnaround time is 4.7 years.

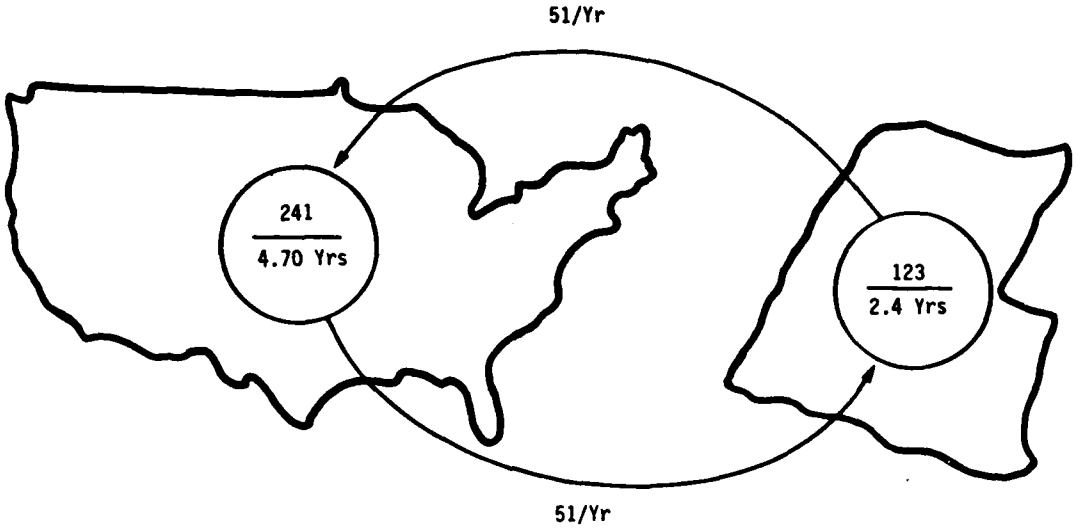


Figure 4-1. Individual Replacement Flow Pattern

d. Given the flow pattern and stay times described above, the turnover rate for CONUS activities and units is 21 percent, while the Europe turnover rate is 42 percent.

e. A somewhat different picture emerges when the 18/18 replacement cycle is imposed on this regiment as is shown in Figure 4-2. In this flow pattern, personnel are drawn from TDA or TOE positions at the CONUS installation to fill replacement companies as they are started up. Accompanied personnel in Europe receive intratheater reassignments to serve out their remaining 18 months when the replacement unit ends its cycle. Included in this figure are the stay times which result in each of these activities. (Note that the nonunit stay time in the OCONUS area has increased from 1.5 to 1.6 years due to the direct assignment of soldiers from CONUS. Since their average stay time is 2.4 years, the overall stay time rises.)

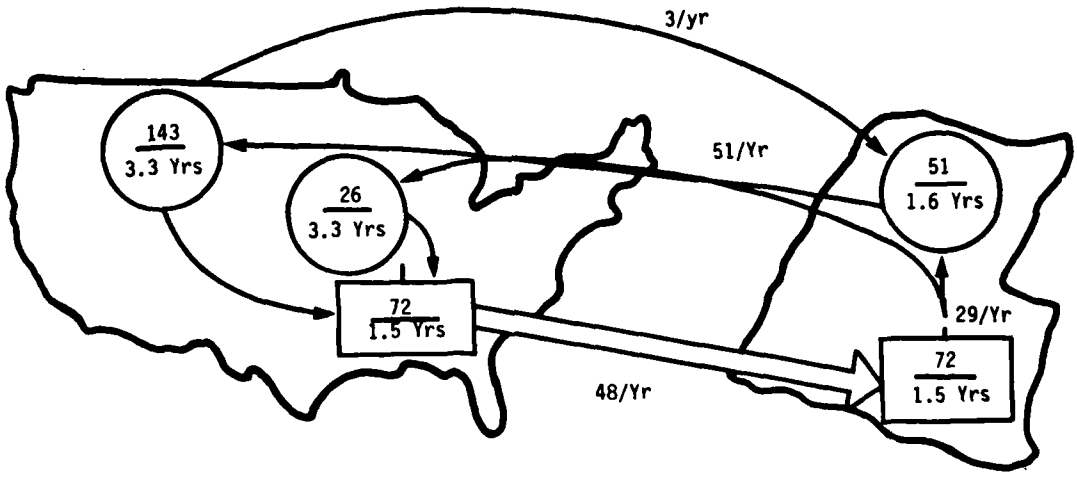


Figure 4-2. Unit Replacement Flow Pattern

f. The turnover rates which result from the expected stay times associated with unit replacement are 63 percent for TDA activities and TOE units above company level in Europe, and 30 percent for the CONUS activities.

g. The increase in turnover described above is common to all regiments, grades, and MOSs when unit replacement is imposed. In fact, for some grades and MOSs, the CONUS turnaround time is so short that only a 4-month stay time outside the replacement unit can be expected; this would yield an annual turnover rate of 300+ percent.

4-5. OBSERVATION - INDIVIDUAL HOMEBASING

a. Although individual, as opposed to unit, homebasing has never been a part of the official regimental concept, there is a perception on the part of soldiers that homebasing implies repetitive return to the same CONUS installation.

b. For some regiments, particularly those homebased at a school post such as Fort Benning for infantry regiments, Fort Sill for artillery regiments, and Fort Knox for armor regiments, individual homebasing will occur--soldiers will almost always return to the regimental homebase upon completion of an overseas tour. The same is not true, however, of regiments homebased at divisional posts such as Fort Riley or Fort Carson.

c. Table 4-2 illustrates the differences discussed above, and also points up the fact that the opportunity for individual homebasing tends to decrease as the soldier increases in rank.

Table 4-2. Individual Homebasing Comparison

Regiment	Homebase	Percent of CONUS positions at homebase			
		E5	E6	E7	E8
7th Inf	Ft Benning	100	100	100	100
8th Inf	Ft Carson	85	38	31	40
12th Inf	Ft Carson	85	38	33	40

d. It should be made clear that the regimental system, except for a few regiments, will not fulfill the expectation on the part of soldiers to enjoy repetitive assignments to a single CONUS installation, or to have greater geographic stability than exists under the current system.

APPENDIX A

STUDY CONTRIBUTORS

1. STUDY TEAM

   a. Study Director

      MAJ C. B. Torres, Force Systems Directorate

   b. Team Members

      MAJ W. L. Carr

      MAJ R. T. Hottell

      Mr. M. C. Lawrence

      Mr. J. Levy

2. PRODUCT REVIEW BOARD

   Mr. T. J. Kitchell, Chairman, Strategy, Concepts and Plans Directorate

   LTC M. Zimmerman, Forces Directorate

   Ms. V. Jugan

APPENDIX B

STUDY DIRECTIVES

Section I. STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310

REPLY TO ATTENTION OF

DAPE-ZXB

19 NOV 1982

SUBJECT: Study: Unit Replacement System Analysis III (URSA III)

Director
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814

1. PURPOSE OF DIRECTIVE. This directive provides guidelines for an analysis of several aspects of the company replacement concept which is being implemented.

2. BACKGROUND.

a. The Manning Task Force (MTF) of the Office of the Deputy Chief of Staff for Personnel (ODCSPER) has been charged with formulation of a new manning concept to reduce the turbulence associated with the current individual replacement system. Two key facets of the new manning concept are company replacement and implementation of a regimental system.

b. The Office of the Deputy Chief of Staff for Operations (ODCSOPS) has developed a proposal for grouping combat arms units into regiments. Associated with this proposal are several issues which require analysis before it is implemented.

3. PURPOSE OF STUDY. To assist in implementation of the long and short tour company replacement alternatives selected by the CSA, within the framework of specific regimental designations and homebases.

4. STUDY PROPONENT. Office of the Deputy Chief of Staff for Personnel.

5. STUDY AGENCY. US Army Concept Analysis Agency (CAA).

6. TERMS OF REFERENCE.

a. Objectives.

(1) Phase I (16 August 1982 - 30 September 1982).

(a) Develop a methodology to allocate personnel spaces to regiments. The allocation should minimize the deviation between regiments in turnaround time, promotion opportunity, and time served in regimental units.

DAPE-ZXB 19 NOV 1982
SUBJECT: Study: Unit Replacement System Analysis III (URSA III)

(b) Determine the allocation of CMF 11, 12, 13, 16 and 19 personnel spaces to designated regiments under the ODCSOPS proposal.

(2) Phase II (1 October 1982 - 31 March 1983).

(a) Determine what initial mix by grade of personnel in replacement units will meet proponent-defined manning objectives at the least manpower cost.

(b) Analyze the impact of varying the mental category/educational mix of first-termers on unit manning levels.

(c) Describe the impact of unit replacement and the regimental system on the career patterns of individual soldiers.

(d) Describe the personnel flow patterns of a mechanized infantry regiment.

(e) Determine manpower and dollar impacts of army-wide implementation.

(f) Identify and analyze means of reducing manpower impacts of Army-wide implementation.

b. Scope. (Phase II)

(1) Only infantry units will be considered.

(2) Only enlisted personnel in CMF 11 will be considered.

(3) The analysis will consider only a peacetime, steady-state operation.

(4) The unit long-tour cycle will consist of 18 months in CONUS followed by 18 months OCONUS.

(5) The unit short-tour cycle will consist of 24 months in CONUS followed by 12 months OCONUS

(6) The analysis will consider homebasing requirements for designated regiments. Site specific data will be used.

c. Timeframe. FY 86.

d. Assumptions.

(1) Replacement units will be rifle and antiarmor companies.

(2) World-wide deployment of units for FY 86 and beyond will be fixed.

19 NOV 1982

DAPE-ZXB
SUBJECT: Study: Unit Replacement System Analysis III (URSA III)

(3) Personnel authorization documents for FY 86 will be used. No increase in personnel authorizations will be permitted.

(4) Regiments will be as designated by ODCSOPS.

e. *Questions to be Answered by the Analysis.*

(1) What should the CMF 11, 12, 13, 16 and 19 personnel authorizations be by grade and MOS for each designated regiment? (Phase I)

(2) What should the initial strength (Personnel loading) of replacement mechanized companies be by grade and MOS? (Phase II)

(3) Given the initial manning (personnel loading) of replacement companies from (2) above, what changes in the maximum, minimum, and average unit strength over a cycle would result from the attrition rates associated with variations in the mental category/education level mix of first-term soldiers? (Phase II)

(4) How would initial loading and strength level change if "some" accompanied careerists in the original OCONUS long tour company remained in place to fall in on the newly arriving OCONUS long tour unit? (Phase II)

(5) Describe the career pattern of a soldier serving in a typical MECH regiment. (Phase II)

(6) Where (in terms of theater and type assignment) do departing soldiers go at critical points in the unit cycle; and, where do incoming soldiers originate (by grade and MOS)? (Phase II)

(7) What is the expected change in PCS cost and manpower requirements? (Phase II)

7. RESPONSIBILITIES.

a. ODCSPER will:

(1) Provide a study coordinator to support the study.

(2) Prepare an evaluation of study results in accordance with AR 5-5.

b. CAA will:

(1) Designate a study director and establish a full-time study team.

(2) Communicate with appropriate agencies for data necessary for the study accomplishment.

DAPE-ZXB
SUBJECT: Study: Unit Replacement System Analysis III (URSA III) 1982

(3) Provide ADP support as required for study accomplishment.

(4) Provide final study results to the study proponent.

8. REFERENCES.

a. AR 5-5, The Army Study System, 5 July 1977.

b. The Army Authorization Documents System (TAADS), ODCSOPS, 12 June 1981.

c. Report, Unit Replacement System Analysis I, CAA-SR-82-1, January 1982.

d. Report, Unit Replacement System Analysis II, CAA-SR-82-3, May 1982.

f. Letter, HQDA, DAPE-ZXB, 22 January 1982, subject: Manning System Army Implementation Instructions.

9. ADMINISTRATION.

a. Support. Secretarial support will be provided by CAA.

b. Milestone Schedule.

(1) IPR (Phase I)	15 October 1982
(2) IPR (Phase II)	1 March 1983
(3) Deliver final report	31 May 1983

c. Control Procedures. ODCSPER study coordinator will provide guidance for the study.

d. Action Document. A final study report will be published and copies provided to the study proponent.

e. Coordination. This tasking directive has been coordinated with CAA in accordance with AR 10-38.

FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

B. I. LEGGE
Colonel, GS
Director, Manning Task Force

Section II. MODIFICATION TO STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310

REPLY TO ATTENTION OF

DAPE-ZXP

28 JAN 1983

Subject: Change to Study - Unit Replacement System Analysis III (URSA III)

Director
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20814

1. Reference DAPE-ZXP letter dated 19 November 1982, subject: Study, Unit Replacement System Analysis III (URSA III).

2. Referenced letter constitutes the study directive for the URSA III effort by the US Army Concepts Analysis Agency. The analysis was originally conceived as two independent phases. The first phase was to prorate the Army's authorizations (FY 88) for combat MOS's among the proposed regiments so that MILPERCEN can correctly affiliate soldiers to these regiments. The second phase was to answer specific personnel questions with regard to the regimental system and unit rotation system. These questions focus on unit loading profiles, personnel flow patterns, and PCS costs.

3. While the proration analysis was progressing, MILPERCEN concurrently developed an affiliation plan which gives a CY 1983 EDATE for 13 of the first 16 regiments, the first EDATE occurring in January 1983. In order for URSA III proration results to be used in these early regimental affiliations the proration of CMF's 11, 19, and 13 must be applied to the FY 83 and FY 88 force structures and results provided to the Manning Task Force as soon as is practical. The addition of the FY 83 force structure will provide MILPERCEN two data points in the decision on how to affiliate the early regiments. Proration results are required for CMF 11 immediately, CMF 19 by 18 February, and CMF 13 by 18 March.

4. With your concurrence I would like the URSA III team to add the FY 83 proration requirement to their effort. If this additional requirement reduces the line of credit available for the second phase personnel analysis I am willing to drop the loading profile portion of that analysis. These modifications have been coordinated with MAJ Torres, the URSA III study director. It is my understanding that the recommended changes can be implemented with no increase in the technical man-months required to complete the study.

B. I. Legge

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as

B. I. LEGGE
COL, GS
Director, Manning Task Force

APPENDIX C

DETAILED METHODOLOGY

C-1. INTRODUCTION. The purpose of this appendix is to provide a detailed description of the methodology employed in the URSA III Study. The description is focused on the model employed and the detailed calculations of the goals, achievement functions, and constraints.

C-2. PROBLEM

a. The ODCSOPS actions of linking and pairing established the basic structure of each regiment and fixed a part of each regiment's personnel authorization; that is, the number of TOE positions in each of the component battalions. This action did not, however, distribute any of the TDA or TOE spaces above battalion level (ERA spaces).

b. The problem, then, was to distribute the ERA spaces to regiments so as to minimize the differences which would be experienced by soldiers of the same grade and MOS who were affiliated with different regiments.

C-3. APPROACH

a. The approach used was to formulate a sequential linear goal programing model in which the decision variables (X (I, J, K)) were the number of grade K ERA spaces allocated from location I to regiment J. Goals were formulated as functions of the form

$$\sum_{I} A(I,J,K) \times X(I,J,K) = \text{Goal}$$

where: A(I,J,K) = some coefficient associated with location I, regiment J, and grade K
X(I,J,K) = decision variable
Goal = goal to be achieved

And, since the goals were not always perfectly achievable, deviation variables DN and DP were introduced so that the final form of the rows was

$$\sum_{I} [A(I,J,K) \times X(I,J,K)] + DN(J,K) - DP(J,K) = \text{Goal 1}$$

and the achievement function was

$$\text{Min} \sum_J \sum_K [|DN(J,K)| + |DP(J,K)|].$$

b. In this model, the importance of goals is preemptive; that is, the model satisfies the first goal as well as possible, subject to the binding constraints. Then it satisfies the second goal as well as possible, subject to the binding constraints as well as the condition that the previous achievement function cannot be degraded. For example, assume the deviation variables for Goal 1 are DN1(J,K) and DP1(J,K); for Goal 2 they are DN2(J,K) and DP2(J,K). Then the problem formulation for the first priority goal is

$$\text{Min} \sum_J \sum_K [|DN1(J,K)| + |DP1(J,K)|]$$

subject to satisfying the goal

$$\sum_I [A(I,J,K) \times X(I,J,K)] + DN1(J,K) - DP1(J,K) = \text{Goal 1},$$

and satisfying the binding constraints

$$\sum_I [B(I,J,K) \times X(I,J,K)] = C(J,K),$$

for every regiment J and grade K.

Then the solution of the priority 2 goal is formulated for every regiment J and grade K as follows:

$$\text{Min} \sum_J \sum_K [|DN2(J,K)| + |DP2(J,K)|]$$

subject to satisfying the goal

$$\sum_I [A2(I,J,K) \times X(I,J,K)] + DN2(J,K) - DP2(J,K) = \text{Goal 2},$$

satisfying the binding constraints

$$\sum_I [B(I,J,K) \times X(I,J,K)] = C(J,K),$$

and, in addition, satisfying the previous priority

$$\sum_J \sum_K [|DN1(J,K)| + |DP1(J,K)|] = Z1,$$

where: Z1 = optimal value obtained in satisfying the first priority goal.

Similarly, the third priority is solved by

$$\text{Min} \sum_J \sum_K [|DN3(J,K)| + |DP3(J,K)|]$$

subject to

(1) Satisfication of the third goal,

(2) Satisfication of the binding constraints, and

(3) Satisfication of the additional constraints:

$$\sum_J \sum_K [|DN1(J,K)| + |DP1(J,K)|] = Z1$$

$$\sum_J \sum_K [|DN2(J,K)| + |DP2(J,K)|] = Z2.$$

The remaining priorities are handled in a similar manner. The exception to this process is the geographic correctness goal which is a maximization function and does not have deviation variables. It is subject to satisfaction of the binding constraints and previous priority constraints.

c. In the next two paragraphs, the detailed equations for the binding constraints, goals, and achievement functions are developed.

C-4. CONSTRAINTS

a. General. There are two types of binding constraints in the model. The first consists of "availability" constraints, the second consists of "capacity" constraints. They require the model to do the following:

(1) Availability Constraints. Allocate all ERA positions.

(2) Homebase Capacity Constraints. Divide the ERA positions at a location among all rotational regiments homebased there to satisfy, as well as possible, flow requirements.

(3) Non-homebase Capacity Constraints. Allocate CONUS ERA positions to regiments to satisfy, as well as possible, each regiment's flow requirements. In the event there are insufficient CONUS ERA positions to satify the flow requirements, factor the flow requirements down to guarantee feasibility.

(4) Overseas Capacity Constraints. Allocate positions in overseas areas to regiments in that area to ensure that accompanied personnel have a position for the nonunit portion of their tour. It is assumed that 60 percent of the personnel are accompanied; hence, 60 percent of the replacement strength in a long-tour area need a position to fill after 18 months. In many cases there are insufficient ERA positions to satisfy every regiment so shortages are shared by all regiments rotating to the same overseas area.

b. Detailed Description

(1) Availability Constraints. Each availability constraint is as follows for every location I and grade K:

$$\sum_{J} X(I,J,K) = AVAIL(I,K)$$

where: AVAIL(I,K) = number of grade K ERA positions at location I
X(I,J,K) = decision variable, the number of grade K positions to allocate from location I to regiment J.

(2) Homebase Capacity Constraints. The homebase capacity constraints are as follows:

$$X(I',J,K) \geq \min [HBFLOMOD(I',J,K), HBFLO(I',J,K), DEMCON(J,K)]$$

where: X(I',J,K) = the decision variable
I' = homebase location
HBFLO = the number of personnel required to meet the flow requirement for regiment J at the homebase (see detailed calculation below)
HBFLOMOD = modified flow requirement at the homebase (see detailed calculation below)
DEMCON = number of personnel required to meet regiment J's total CONUS flow requirement at the homebase.

If the regiment has an alternate base, then DEMCON is the flow requirement at both bases while HBFLO is the flow requirement at the homebase.

(a) Calculation of DEMCON. Since all regiments do not contain rotational elements, two formulations are required.

1. Case I: Rotational Unit. It is possible for a regiment to have an alternate base and rotate to more than one overseas area. Nevertheless, its rotational and nonrotational parts can be totaled to view the regiment as shown in Figure C-1.

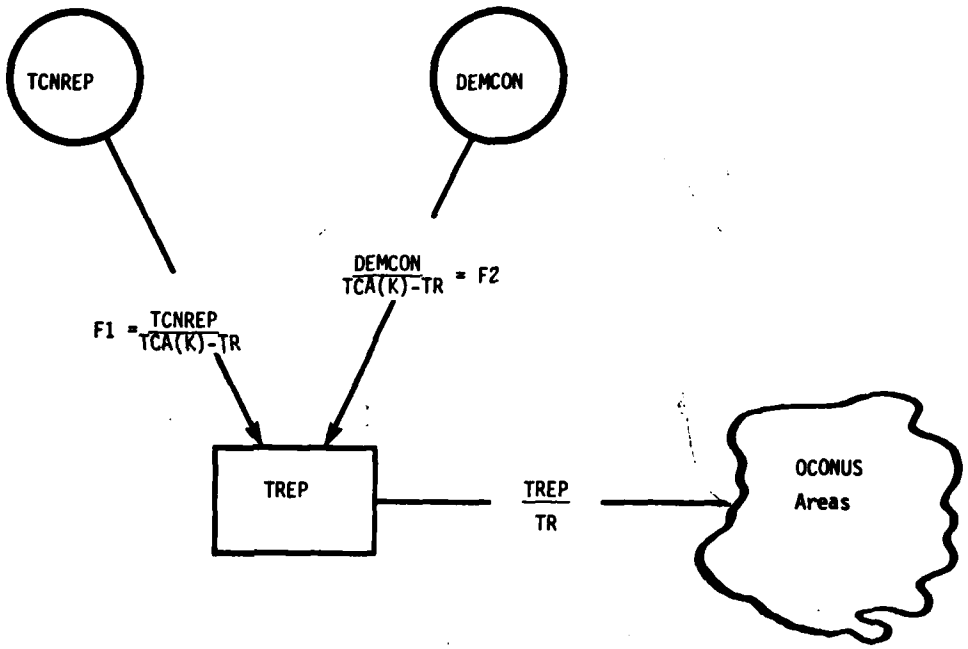


Figure C-1. Regimental Flow Diagram - Rotational Unit

It is required that F1 + F2 = TREP/TR. Substituting, and solving for DEMCON yields

$$DEMCON(J,K) = (TCA(K) - TR) \times (TREP/TR - TCNREP/[TCA(K) - TR])$$

where:
- TCA(K) = CONUS stay time for grade K
- TR = CONUS stay time in rotational unit
- TCA(K) - TR = CONUS stay time outside of rotational unit
- TREP = total rotational strength in regiment
- TCNREP = total nonrotational strength in regiment.

Therefore DEMCON represents the number of personnel the regiment needs to meet its rotational flow requirements and have a stay time in CONUS of TCA(K).

2. Case II: Nonrotational Unit. For nonrotational units it is assumed that CONUS-to-CONUS PCSs will not occur since they are not required by the system. Hence the regiment can be viewed as shown in Figure C-2 regardless of its specific configuration.

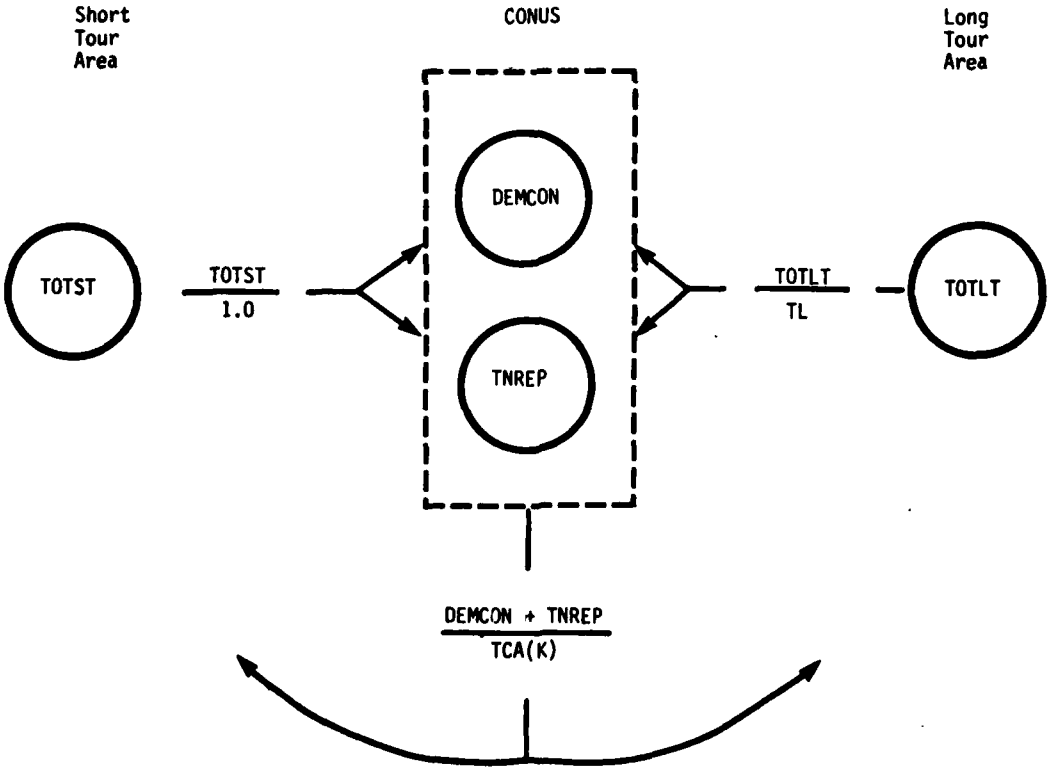


Figure C-2. Regimental Flow Diagram - Nonrotational Unit

Since the flow into CONUS equals the flow out of CONUS it follows that

$$\frac{DEMCON + TNREP}{TCA(K)} = \frac{TOTST}{1.0} + \frac{TOTLT}{LT}$$

and

$$DEMCON = TCA(K) \times [TOTST + TOTLT/LT] - TNREP$$

where: TOTST = total short-tour strength
TOTLT = total long-tour strength
TNREP = total assigned to regiment before allocation
TL = long-tour stay time.

(b) Calculation of HBFLO. HBFLO is the number of personnel required at the homebase to satisfy the flow requirements for the home-based rotational units. It is only calculated for rotational units. Regardless of the regiment's complete configuration, it has a rotational, nonrotational, and ERA component at the homebase as depicted in Figure C-3.

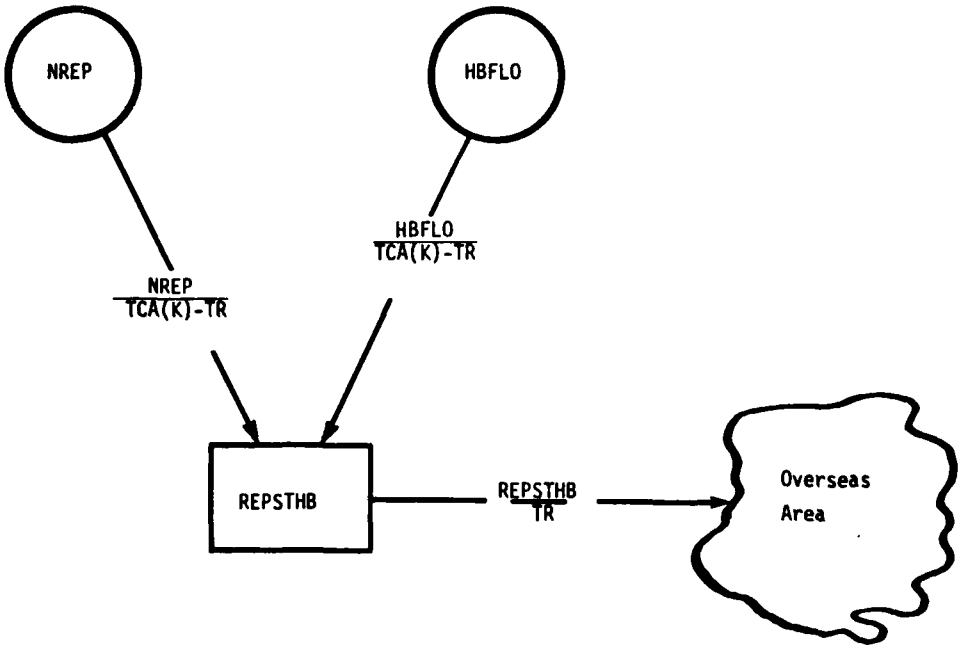


Figure C-3. Regimental Flow Diagram - Rotational Unit's Homebase Components

Since flows into the rotational unit must equal the flows out, it follows that

$$\frac{\text{NREP}}{\text{TCA(K)-TR}} + \frac{\text{HBFLO}}{\text{TCA(K)-TR}} = \frac{\text{REPSTHB}}{\text{TR}}$$

where: REPSTHB = regiment's rotational strength at the homebase
NREP = regiment's nonrotational strength at the homebase
TR = stay time in CONUS rotational unit
TCA(K) = stay time in CONUS for grade K.

(c) Calculation of HBFLOMOD. HBFLOMOD is required because HBLFO may exceed the number of ERA positions at the homebase. Additionally there may be more than one regiment homebased at this location competing for the same spaces. For example, suppose Regiment 1 requires 15 spaces, Regiment 2 requires 10 spaces and there are only 10 spaces available. This is resolved by allocating to both regiments .4 of their HBFLO requirement. So Regiment 1 gets 6 and Regiment 2 gets 4 spaces.

In general,

$$\text{HBFLOMOD} = \text{HBFLO} \times \frac{\text{AVAIL(HB)}}{\text{TOTHBFLO}}$$

where: AVAIL(HB) = number of ERA positions available for allocation at homebase
TOTHBFLO = total of all HBFLO requirements at this location.

It should be noted that if HBFLO is smaller than AVAIL and if TOTHBFLO = HBFLO (as in the case where only 1 regiment is homebased at current location) then HBFLOMOD = AVAIL, which is greater than HBFLO. This is why the constraint wants the Min [HBFLO, HBFLOMOD]. DEMCON is also included in the homebase capacity constraint to handle the case where a regiment has a large nonrotational component at another location and the total CONUS demand (DEMCON) is zero or less than HBFLO. Hence the homebase capacity constraint is

$$X(I',J,K) \geq \text{Min } [\text{HBFLO}(I',J,K), \text{HBFLOMOD}(I',J,K), \text{DEMCON}(J,K)]$$

(3) Non-homebase Capacity Constraint. The constraint equation is

$$\sum_{i=1}^{MXCN} X(I,J,K) \geq DEMCON(J,K) \times \min [RATIO(K),1.0]$$

where: DEMCON is previously defined and RATIO(K) is the ratio of the sum of all available ERA positions to the sum of all regimental demands.

$$RATIO(K) = \sum_{I=1}^{MXCN} AVAIL(I,K) / \sum_{J} DEMCON(J,K)$$

where: MXCN = max CONUS location (i.e., sum over all CONUS locations)
AVAIL(I,K) = number of grade K ERA positions available to be allocated at location I.

If the sum of demands exceeds the sum of availables, RATIO(K) will be less than 1. So, in effect, the CONUS demand is modified to guarantee that the set of generated constraints will be feasible. If RATIO(K) is greater than 1, the available supply exceeds the demand so the demand is allocated.

(4) Overseas Capacity Constraints. In a rotational unit overseas, personnel in the unit will depart after 18 months. It is assumed that 40 percent are unaccompanied and will return to CONUS, and that 60 percent are accompanied and should remain overseas to complete a 3-year tour. The constraint attempts to allocate sufficient spaces in the long-tour area to ensure accompanied personnel have a position to fill when they depart the unit. The situation in an overseas area is constrained in the sense that there is more demand for spaces than there are spaces. To resolve this, the capacity (CAP) to absorb personnel into nonrotational components of the regiment is computed for every regiment and grade located in the overseas area as well as its demand (DEM), i.e., how many positions does it need in order to absorb the personnel departing the rotational unit. If a regiment's CAP exceeds its DEM, then it has sufficient nonrotational strength already assigned in the long-tour area to provide positions for personnel coming out of the rotational units. If DEM exceeds CAP, then additional spaces should be allocated to fill the regiment's demand. So,

$$DEM(I,J,K) = .6 \times REPSTR(I,J,K)$$

$$CAP(I,J,K) = ASG(I,J,K) - REPSTR(I,J,K)$$

where: REPSTR(I,J,K) = regiment J's rotational strength in overseas area I for grade K
ASG(I,J,K) = regiment J's assigned strength in overseas area I for grade K.

Total capacity and demand in the particular overseas location are accumulated and the capacity to demand ratio calculated as

$$CAPDEM = \frac{TOTCAP + AVAIL(I,K)}{TOTDEM}$$

Next, each regiment's share is calculated

$$SHARE(I,J,K) = DEM(I,J,K) \times CAPDEM$$

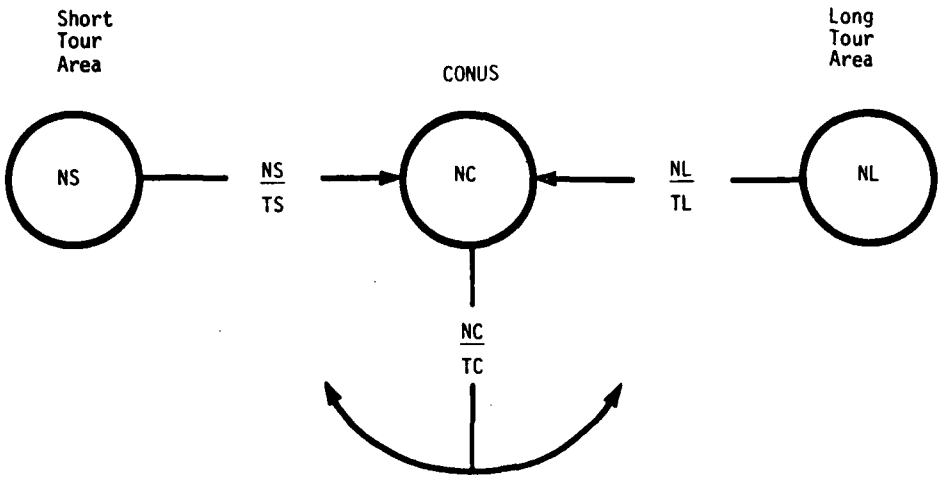
If the regiment's capacity is greater than its share, the regiment is better off than the other regiments and is removed from further consideration. If at least one regiment was removed from consideration, CAPDEM and SHARE must be recalculated from the remaining regiments that rotate to the current location. The process of removing regiments from consideration is repeated until every regiment's SHARE exceeds its capacity (again SHARE is what it ought to get in a constrained resource environment). Finally, an overseas capacity constraint is written for every regiment still under consideration as

$$X(I,J,K) \geq \text{Min}\,[SHARE(I,J,K), DEM(I,J,K)] - CAP(I,J,K)$$

In a "fat" system (i.e., more spaces available than needed) SHARE will exceed DEM and it is unnecessary to allocate more than what the regiment needs, i.e., its DEM.

C-5. GOALS AND ACHIEVEMENT FUNCTIONS

a. Turnaround Time. The turnaround time goal states that for any given grade the regiment's turnaround time should be the same as for the MOS as a whole. The turnaround time for the MOS as a whole is calculated as shown in Figure C-4 (grade K subscripts are omitted).



$$\frac{NC}{TC} = \frac{NS}{TS} + \frac{NL}{TL}$$

And $$TC = \frac{NC \cdot TS \cdot TL}{NS \cdot TL + NL \cdot TS}$$

Figure C-4. Basic Flow Model

where: TC = CONUS turnaround time for the MOS
TS = short-tour stay time
TL = long-tour stay time
NC = number in CONUS
NS = number in short-tour area
NL = number in long-tour area.

In a similiar manner the regimental turnaround time with decision variables included is developed as follows:

$$\frac{NC(J,K) + \sum_{I=1}^{MXCN} X(I,J,K)}{TC} = \frac{NL(J,K) + \sum_{I=MXCN+1}^{MXLT} X(I,J,K)}{TL} + \frac{NS(J,K) + \sum_{I=MXLT+1}^{NLOC} X(I,J,K)}{TL}$$

where: NC(J,K), NL(J,K), NS(J,K) = regimental analogies to NC, NL, NS defined above.
MXCN = the max CONUS location
MXLT = the max long-tour location (MXCN+1, ... , MXLT are all long-tour locations)
NLOC = the number of locations.

Since TC was just calculated above, all values are known except the values for X(I,J,K) for all locations I. Solving for TC yields the goal:

$$TC(K) = TC^*(J,K).$$

where: TC*(J,K) is the regimental turnaround time after allocation.

Typically, there are insufficient personnel spaces in the system to achieve the goal for every regiment and grade, so deviation variables are introduced to yield the goal TC*(J,K) + DNT(J,K) - DPT(J,K) = TC(K). The situation is graphically depicted in Figure C-5.

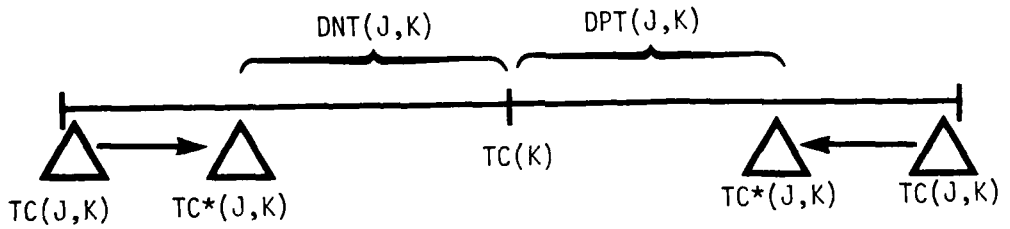


Figure C-5. Turnaround Time Goal

where: TC(J,K) = turnaround time for regiment J, grade K before allocation
TC*(J,K) = turnaround time for regiment J, grade K after allocation
TC(K) = turnaround time for grade K.

After a goal equation is written for every regiment and grade, the actual achievement function becomes

$$\text{Min} \sum_J \sum_K [|DNT(J,K)| + |DPT(J,K)|]$$

b. Promotion Equity. The promotion equity goal states that the promotion opportunity should be the same in every regiment as the MOS as a whole. This is achieved if the ratio of higher to lower grades in each regiment is the same as the overall ratio for the MOS. The goal is represented by the equation:

$$P^*(J,K) = \frac{N(J,K) + \sum_I X(I,J,K)}{N(J,K-1) + \sum_I X(I,J,K-1)} = \frac{N(K)}{N(K-1)} = P(K)$$

where: $N(J,K)$ = number of grade K personnel assigned to regiment J
$N(K)$ = number of grade K personnel in system
$X(I,J,K)$ = decision variable as previously defined.

This goal may or may not be achievable in all cases, so deviation variables are introduced. Graphically the goal is illustrated in Figure C-6.

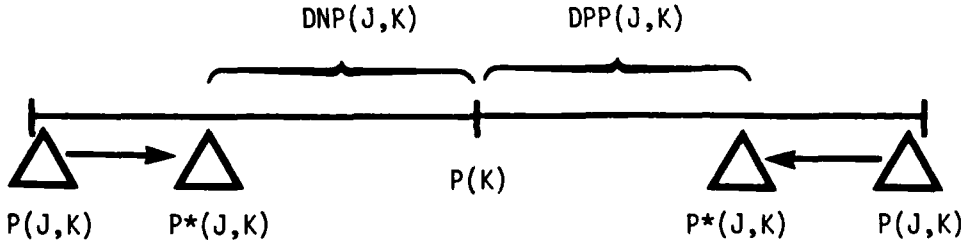


Figure C-6. Promotion Opportunity Goal

The complete equation is

$$P^*(J,K) + DNP(J,K) - DPP(J,K) = P(K)$$

for every regiment and grade.

The achievement function is

$$\text{Min} \sum_J \sum_K [|DN(J,K)| + |DP(J,K)|].$$

c. Geographic Correctness. The geographic correctness goal states that as many positions as possible will be allocated in a "geographically correct" way. Profit coefficients were defined for every regiment and location combination, with four as the highest profit and one the lowest. A complete list of profit coefficients for CMF 11 appears in Table C-1. As an example, this table indicates that the 52d Infantry is homebased at FT Polk [P(10,8) = 4] and has an alternate homebase at FT Irwin [P(6,8) = 3]. The regiment rotates to Germany [P(18,8) = 4] and all European countries are assigned a profit coefficient of three. Middle East countries have a coefficient of two and Pacific theater areas are given a coefficient of one. The geographic correctness achievement function was the only one that did not involve deviation variables and is a maximization function:

$$\text{Max} \sum_I \sum_J \sum_K P(I,J,K) \times X(I,J,K)$$

where: P(I,J,K) = Profit coefficients
X(I,J,K) = Decision variable.

d. Unit Tour Opportunity. The unit tour opportunity goal states that every regiment should have the same ratio of ERA to unit spaces as the Army-wide ratio. The Army-wide ratio for a given grade is calculated as follows:

$$R(K) = \frac{\sum_I AVAIL(I,K)}{\sum_I \sum_J ASG(I,J,K)}$$

where: AVAIL(I,K) = number of grade K ERA positions to be allocated at location I
ASG(I,J,K) = number of grade K unit spaces in regiment J at location I.

Table C-1. Profit Coefficients for CMF 11

Location	41st Inf	18th Inf	16th Inf	5th Cav	8th Inf	12th Inf	6th Inf	52d Inf	4th Inf	15th Inf	7th Inf	5th Inf	327th Inf	189th Inf	502d Inf	23d Inf	1st Inf	9th Inf	17th Inf	2d Inf	21st Inf
FT Benning, GA	1	4	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1
FT Bragg, NC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Campbell, KY	1	1	1	1	1	1	1	1	1	1	1	1	4	4	4	1	1	1	1	1	1
FT Carson, CO	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Hood, TX	4	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Irwin, CA	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Knox, KY	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1
FT Lewis, WA	.	3	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	4	1
FT Ord, CA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	1	4
FT Polk, LA	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Riley, KS	1	1	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FT Sill, OK	1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1
FT Stewart, GA	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	1
CONUS other	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OCONUS Alaska	1	3	1	3	1	1	1	1	1	1	1	1	4	3	1	3	3	3	3	3	3
OCONUS Belgium	3	2	3	2	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2
OCONUS Berlin	3	2	3	2	3	3	3	3	3	3	3	3	2	2	4	2	2	2	2	2	.
OCONUS Germany	4	2	4	2	4	4	4	4	4	4	4	4	2	2	3	2	2	2	2	2	2
OCONUS Greece	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1
OCONUS Hawaii	1	3	1	3	1	1	1	1	1	1	1	1	3	3	1	3	4	3	3	4	4
OCONUS Italy	3	2	3	2	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2
OCONUS Japan	1	3	1	3	1	1	1	1	1	1	1	1	3	3	1	3	3	3	3	3	3
OCONUS Netherlands	3	2	3	2	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2
OCONUS Panama	1	4	1	3	1	1	1	1	1	1	1	1	3	4	1	3	3	3	3	3	3
OCONUS Saudi Arabia	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1
OCONUS Turkey	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	1
OCONUS United Kingdom	3	2	3	2	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2	2
OCONUS Korea	1	4	1	4	1	1	1	1	1	1	1	1	2	2	1	4	1	4	4	1	1

For every regiment and grade combination the goal is formulated as follows:

$$\frac{\sum_{I} X(I,J,K)}{\sum_{I} ASG(I,J,K)} = R(K).$$

Deviation variables are introduced as before yielding

$$\sum_{I} X(I,J,K) + DNU(J,K) - DPU(J,K) = R(K) \times \sum_{I} ASG(I,J,K)$$

and the achievement function becomes

$$\text{Min} \sum_{J} \sum_{K} [|DNU(J,K)| + |DPU(J,K)|].$$

e. Short-tour Opportunity. The short-tour opportunity goal states that every regiment should have the same ratio of short-tour spaces to total spaces as the Army-wide ratio. The Army-wide ratio of short-tour spaces to total spaces is calculated as follows:

$$R(K) = \frac{\sum_{J} \sum_{I \epsilon ST} [ASG(I,J,K)] + \sum_{I \epsilon ST} AVAIL(I,K)}{\sum_{J} \sum_{I} [ASG(I,J,K)] + \sum_{I} AVAIL(I,K)}$$

where: ASG and AVAIL are defined as before
ST = set of short-tour locations.

In this problem there was only one short-tour location.

The goal is formulated for every regiment and grade as follows:

$$\frac{\sum_{I \epsilon ST} [ASG(I,J,K) + X(I,J,K)]}{\sum_{I} [ASG(I,J,K) + X(I,J,K)]} = R(K)$$

Deviation variables are introduced as before yielding

$$\sum_{I \epsilon ST} X(I,J,K) - R(K)\sum_{I} X(I,J,K) + DNS(J,K) = R(K)\sum_{I} ASG(I,J,K) - \sum_{I \epsilon ST} ASG(I,J,K)$$

and the achievement function becomes

$$\text{Min} \sum_{J} \sum_{K} [|DNS(J,K)| + |DPS(J,K)|].$$

f. Regimental Size. The regimental size goal states that all regiments be the same size. The average size regiment is computed by dividing the number of regiments into the total number of personnel in the system.

$$AVG(K) = \frac{\sum_{I} \sum_{J} ASG(I,J,K) + \sum_{I} AVAIL(I,K)}{NREGT}$$

where: NREGT = Number of regiments in the system
ASG and AVAIL are previously defined.

For every regiment and grade the goal is formulated as

$$\sum_{I} [ASG(I,J,K) + X(I,J,K)] = AVG(K)$$

Deviation variables are introduced as before and the achievement function is

$$\text{Min} \sum_{J} \sum_{K} [|DNZ(J,K)| + |DPZ(J,K)|].$$

APPENDIX D

DETAILED REPORTS

Section I. GENERAL

D-1. INTRODUCTION. This appendix contains a sample of the allocation reports delivered to the sponsor. Section II reports the distribution of all (assigned and allocated) authorized positions by grade and regiment. Since the model distributed portions of positions in arriving at an optimal solution, fractions are presented to show the computational basis for the reports in Sections III and IV. Section III displays this same distribution as a percentage of the population at each location while Section IV displays it as a percentage of the total system population.

D-2. SUBHEADINGS. Selected report subheadings are defined as follows:

a. HOMEBASE: the designated CONUS home station of the regiment.

b. ALTERNATE BASE: all stations other than the homebase where assigned regimental units are based.

c. CONUS OTHER: all CONUS stations other than the home- and alternate bases.

d. ASSIGNED AREA 1: an OCONUS area where assigned regimental units are posted.

e. ASSIGNED AREA 2: a second OCONUS area where assigned regimental units are posted.

f. OTHER AREAS: all OCONUS areas other than the assigned areas.

Section II. BASIC DISTRIBUTION REPORTS

The tables in this section illustrate the reports which summarize the distribution of all (assigned and allocated) authorized positions for the given grade, MOS, and fiscal year.

Table D-1. Distribution Summary, Grade E3, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	121.00	.00	7.31	128.31	130.33	.00	.00	130.33	258.64
14TH IN	122.00	61.00	65.20	178.20	103.00	52.00	.00	155.00	333.20
16TH IN	126.30	.00	.00	126.00	127.98	.00	.00	127.98	253.98
5TH CAV	12 .00	.00	.00	126.00	60.00	.00	31.89	91.89	211.89
8TH IN	122.21	.00	.00	122.21	120.00	.00	4.12	124.12	246.33
12TH IN	126.79	.00	.00	126.79	125.64	.00	3.15	128.79	255.58
6TH IN	124.20	.00	.00	124.00	125.95	.00	.00	125.95	249.95
52D IN	6 .00	132.20	.00	192.20	195.22	.00	.00	195.22	387.41
4TH IN	122.30	.00	194.04	316.04	321.00	.00	.00	321.00	637.04
15TH IN	63.00	63.00	.00	126.00	121.88	.00	.00	121.88	241.88
7TH IN	128.00	.00	.00	128.00	130.01	.00	.00	130.01	258.01
5TH IN	15.00	.00	160.25	175.25	178.00	.00	.00	178.00	353.25
327TH I	438.00	.00	.00	438.00	386.49	.00	38.92	425.41	863.41
187TH I	292.00	.00	.00	292.00	296.59	.00	.00	296.59	588.59
502D IN	438.00	.00	.00	438.00	440.00	.00	4.88	444.88	882.88
23D IN	170.00	.00	.00	170.00	100.69	.00	21.63	122.32	292.32
1ST IN	170.00	.00	.00	170.00	172.66	.00	.00	172.66	342.66
9TH IN	170.00	.00	.00	170.00	100.69	.00	21.63	122.32	292.32
17TH IN	170.00	.00	.00	170.00	100.69	.00	21.63	122.32	292.32
2D IN	170.00	.00	.00	170.00	172.67	.00	.00	172.67	342.67
21ST IN	170.00	.00	.00	170.00	172.67	.00	.00	172.67	342.67

Table D-2. Distribution Summary, Grade E4, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	482.00	.00	.00	482.00	492.75	.00	.00	492.75	974.75
11TH IN	120.00	272.00	26.53	418.53	158.00	206.00	.00	364.00	782.53
16TH IN	482.00	.00	.00	482.00	485.87	.00	4.59	490.46	972.46
5TH CAV	482.00	.00	.00	482.00	302.41	.00	.00	302.41	784.41
6TH IN	482.00	.00	.00	482.00	492.75	.00	.00	492.75	974.75
17TH IN	482.00	.00	.00	482.00	492.75	.00	.00	492.75	974.75
6TH IN	482.00	.00	.00	482.00	492.75	.00	.00	492.75	974.75
520 IN	241.00	205.00	.00	446.00	455.95	.00	.00	455.95	901.95
4TH IN	496.00	.00	154.49	650.49	665.00	.00	.00	665.00	1315.49
15TH IN	241.00	241.00	.00	482.00	492.75	.00	.00	492.75	974.75
7TH IN	482.00	.00	.00	482.00	492.75	.00	.00	492.75	974.75
5TH IN	33.00	.00	326.97	359.97	368.00	.00	.00	368.00	727.97
327TH I	510.00	.00	.00	510.00	493.00	.00	28.37	521.37	1031.37
187TH I	340.00	.00	.00	340.00	333.00	.00	14.58	347.58	687.58
502D IN	510.00	.00	.00	510.00	512.00	.00	9.37	521.37	1031.37
23D IN	384.00	.00	.00	384.00	192.00	.00	104.56	296.56	680.56
1ST IN	384.00	.00	.00	384.00	388.00	.00	4.56	392.56	776.56
9TH IN	384.00	.00	.00	384.00	192.00	.00	104.56	296.56	680.56
17TH IN	384.00	.00	.00	384.00	192.00	.00	104.56	296.56	680.56
2D IN	384.00	.00	.00	384.00	384.00	.00	8.56	392.56	776.56
21ST IN	384.00	.00	.00	384.00	384.00	.00	8.56	392.56	776.56

Table D-3. Distribution Summary, Grade E5, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
81ST IN	183.00	.00	32.79	215.79	218.82	.00	.00	218.82	434.61
18TH IN	79.54	81.32	23.48	184.35	55.00	82.00	.00	137.00	321.35
1STH IN	156.00	.00	30.46	186.46	188.98	.00	.00	188.98	375.44
5TH CAV	156.00	.00	.00	156.00	82.11	.00	.00	82.11	238.11
6TH IN	159.00	.00	27.46	186.46	188.98	.00	.00	188.98	375.44
10TH IN	159.00	.00	27.46	186.46	188.98	.00	.00	188.98	375.44
6TH IN	159.00	.00	27.46	186.46	188.98	.00	.00	188.98	375.44
52D IN	78.00	90.00	.00	168.00	161.00	.00	.00	161.00	329.00
9TH IN	184.67	.00	34.15	218.81	253.00	.00	.00	253.00	471.81
1STH IN	92.33	100.00	23.46	215.79	218.82	.00	.00	218.82	434.61
7TH IN	186.46	.00	.00	186.46	188.98	.00	.00	188.98	375.44
5TH IN	14.00	.00	93.43	107.43	156.00	.00	.00	156.00	263.43
327TH I	171.00	.00	.00	171.00	180.02	.00	.00	180.02	351.02
187TH I	114.00	.00	.00	114.00	118.00	.00	2.01	120.01	234.01
502D IN	199.51	.00	.00	199.51	175.95	.00	6.38	182.33	381.84
2ND IN	116.00	.00	.00	116.00	58.00	.00	6.12	64.12	180.12
1ST IN	133.34	.00	.00	133.34	117.65	.00	18.45	136.10	269.44
9TH IN	116.00	.00	.00	116.00	58.00	.00	6.12	64.12	180.12
17TH IN	116.00	.00	.00	116.00	58.00	.00	6.12	64.12	180.12
2D IN	133.34	.00	.00	133.34	117.70	.00	16.36	134.06	267.40
21ST IN	133.34	.00	.00	133.34	117.65	.00	12.79	130.44	263.78

Table D-4. Distribution Summary, Grade E6, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	122.23	.00	102.87	225.11	104.67	.00	4.39	109.06	334.16
18TH IN	264.14	31.00	.00	300.14	36.00	49.00	.00	85.00	385.14
16TH IN	98.20	.00	142.67	240.87	104.67	.00	18.60	123.27	364.14
5TH CAV	153.77	.00	82.34	186.11	36.00	.00	8.84	44.84	230.95
8TH IN	85.00	.00	140.11	225.11	104.67	.00	4.39	109.06	334.16
12TH IN	85.00	.00	140.11	225.11	104.67	.00	4.39	109.06	334.16
6TH IN	85.33	.00	139.77	225.11	104.67	.00	4.39	109.06	334.16
52D IN	42.67	44.00	126.16	212.83	86.00	.00	20.27	106.27	319.10
4TH IN	83.33	.00	175.11	258.44	125.31	.00	6.95	132.26	390.70
15TH IN	91.67	205.45	.00	297.12	104.67	.00	19.74	124.41	421.53
7TH IN	249.81	.00	.00	249.81	104.67	.00	9.66	114.33	364.14
9TH IN	7.00	.00	162.01	169.01	83.00	.00	3.49	86.49	255.51
327TH I	129.43	.00	95.77	225.20	115.25	.00	.00	115.25	340.46
187TH I	91.50	.00	96.09	187.59	95.68	.00	.13	95.81	283.40
502D IN	145.27	.00	192.59	337.86	119.94	.00	22.02	141.96	479.82
2ND IN	83.83	.00	61.55	145.38	31.00	.00	.00	31.00	176.38
1ST IN	98.09	.00	74.78	172.87	72.56	.00	15.91	88.47	261.33
9TH IN	72.13	.00	73.25	145.38	31.00	.00	.00	31.00	176.38
17TH IN	72.13	.00	73.25	145.38	31.00	.00	.00	31.00	176.38
3D IN	98.09	.00	73.47	171.56	72.88	.00	14.92	87.80	259.35
21ST IN	78.74	.00	90.49	169.24	72.56	.00	14.05	86.61	255.84

Table D-5. Distribution Summary, Grade E7, MOS 11B, FY 86

REGIMENT	CONUS				OCONUS				TOTAL
	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	
41ST IN	67.99	.00	53.44	121.44	49.89	.00	.00	49.89	171.33
14TH IN	151.24	11.00	.00	162.24	13.00	22.36	.00	35.36	197.60
16TH IN	67.00	.00	65.33	132.33	54.37	.00	.00	54.37	186.70
5TH CAV	54.01	.00	45.80	99.81	16.00	.00	2.60	18.60	118.41
8TH IN	39.50	.00	66.90	126.40	39.92	.00	5.01	44.93	171.33
12TH IN	39.50	.00	81.94	121.44	49.89	.00	.00	49.89	171.33
6TH IN	42.67	.00	84.54	127.20	38.32	.00	5.81	44.13	171.33
52D IN	21.33	27.00	67.63	115.96	47.64	.00	.00	47.64	163.61
4TH IN	42.00	.00	99.98	141.98	58.33	.00	.00	58.33	200.32
15TH IN	21.00	144.45	.00	165.45	38.32	.00	12.36	50.67	216.12
7TH IN	140.33	.00	.00	140.33	38.42	.00	8.06	46.37	186.70
5TH IN	5.00	.00	87.65	92.65	29.00	.00	9.15	38.15	131.00
327TH I	39.66	.00	84.07	123.72	50.83	.00	.00	50.83	174.56
187TH I	29.25	.00	73.74	102.99	42.31	.00	.00	42.31	145.31
5&2D IN	48.09	.00	140.45	188.55	33.00	.00	24.36	57.36	245.91
23D IN	34.30	.00	40.76	75.06	11.05	.00	4.33	15.37	90.43
1ST IN	41.35	.00	53.62	94.97	28.73	.00	10.29	39.02	133.99
9TH IN	28.72	.00	46.30	75.01	11.00	.00	4.42	15.42	90.43
17TH IN	28.72	.00	46.30	75.01	11.00	.00	4.42	15.42	90.43
2D IN	41.35	.00	52.90	94.25	29.07	.00	9.65	38.72	132.98
21ST IN	34.57	.00	60.41	92.98	38.20	.00	.00	38.20	131.18

Table D-6. Distribution Summary, Grade E8, MOS 11B, FY 86

REGIMENT	CONUS				OCONUS				TOTAL
	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	
81ST IN	34.55	.00	27.72	62.27	30.74	.00	.00	30.74	93.02
101ST IN	74.55	6.00	.00	80.55	17.41	9.31	.00	26.73	107.28
187TH IN	76.33	.00	.00	76.33	16.00	.00	9.03	25.03	101.36
5TH CAV	19.45	.00	31.09	50.54	8.00	.00	5.75	13.75	64.29
8TH IN	25.00	.00	37.27	62.27	30.74	.00	.00	30.74	93.02
1.TH IN	25.00	.00	37.27	62.27	30.74	.00	.00	30.74	93.02
6TH IN	25.93	.00	36.35	62.27	30.74	.00	.00	30.74	93.02
52D IN	14.07	12.00	33.39	59.47	29.36	.00	.00	29.36	88.82
4TH IN	27.04	.00	45.77	72.81	35.94	.00	.00	35.94	108.75
15TH IN	12.96	68.52	.00	81.48	32.72	.00	3.13	35.85	117.33
7TH IN	76.33	.00	.00	76.33	16.00	.00	9.03	25.03	101.36
5TH IN	4.00	.00	43.63	47.63	16.00	.00	7.51	23.51	71.14
327TH I	21.00	.00	42.44	63.44	31.32	.00	.00	31.32	94.77
187TH I	16.20	.00	36.61	52.81	26.07	.00	.00	26.07	78.89
5:2D IN	42.60	.00	51.73	94.53	27.00	.00	11.98	38.98	133.50
2:D IN	34.58	.00	24.85	39.43	7.00	.00	2.67	9.67	49.10
1ST IN	48.65	.00	.05	48.70	24.04	.00	.00	24.04	72.74
9TH IN	14.58	.00	24.85	39.43	7.00	.00	2.67	9.67	49.10
17TH IN	28.97	.00	10.46	39.43	7.00	.00	2.67	9.67	49.10
3D IN	20.77	.00	27.56	48.33	23.66	.00	.00	23.66	72.19
21ST IN	19.45	.00	24.23	47.68	18.10	.00	5.44	23.54	71.22

Section III. DISTRIBUTION AS A PERCENTAGE OF THE LOCAL POPULATION

The tables in this section illustrate the reports which express the Section II distributions by percentage of the population at each location.

Table D-7. Distribution Summary by Location Percentage, Grade E3, Mos 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	56.71	.00	.19	3.17	8.27	.00	.00	3.36	3.26
161TH IN	6.57	3.43	2.57	4.41	25.43	11.48	.00	3.99	4.20
187TH IN	100.00	.00	.00	3.11	8.12	.00	.00	3.30	3.20
5TH CAV	49.79	.00	.00	2.97	13.25	.00	.19	2.37	2.67
6TH IN	49.38	.00	.00	3.02	7.61	.00	.05	3.20	3.11
1[illegible]TH IN	56.92	.00	.00	3.13	7.97	.00	.03	3.32	3.22
6TH IN	67.39	.00	.00	3.07	7.99	.00	.00	3.24	3.15
82D IN	32.61	24.66	.00	4.75	12.39	.00	.00	5.03	4.89
4TH IN	67.03	.00	5.02	7.81	20.37	.00	.00	8.27	8.04
15TH IN	32.97	25.00	.00	2.97	7.73	.00	.00	3.14	3.05
7TH IN	91.43	.00	.00	3.16	8.25	.00	.00	3.35	3.25
5TH IN	100.00	.00	3.98	4.33	11.29	.00	.00	4.59	4.46
327TH I	36.41	.00	.00	10.83	81.71	.00	.21	10.96	10.89
187TH I	24.27	.00	.00	7.22	73.23	.00	.00	7.64	7.43
5[illegible]D IN	36.41	.00	.00	10.83	100.00	.00	.03	11.46	11.14
2[illegible]D IN	28.76	.00	.00	4.20	22.23	.00	.13	3.15	3.69
1ST IN	28.76	.00	.00	4.20	33.33	.00	.00	4.45	4.32
9TH IN	3[illegible].82	.00	.00	4.20	22.23	.00	.13	3.15	3.69
17TH IN	3[illegible].82	.00	.00	4.20	22.23	.00	.13	3.15	3.69
2D IN	28.76	.00	.00	4.20	33.33	.00	.00	4.45	4.32
21ST IN	32.82	.00	.00	4.20	33.33	.00	.00	4.45	4.32

Table D-8. Distribution Summary by Location Percentage, Grade E4, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
81ST IN	49.59	.00	.00	5.13	9.48	.00	.00	5.44	5.28
19TH IN	14.93	4.78	.36	4.45	32.18	18.92	.00	8.02	4.24
10TH IN	96.21	.00	.00	5.13	9.35	.00	.05	5.41	5.27
5TH CAV	49.59	.00	.00	5.13	27.77	.00	.00	3.34	4.25
3TH IN	49.74	.00	.00	5.13	9.48	.00	.00	5.44	5.28
12TH IN	49.74	.00	.00	5.13	9.48	.00	.00	5.44	5.28
6TH IN	49.62	.00	.00	5.13	9.48	.00	.00	5.44	5.28
5CD IN	32.61	24.17	.00	4.75	8.77	.00	.00	5.03	4.89
4TH IN	67.30	.00	1.78	6.92	12.80	.00	.00	7.34	7.13
15TH IN	32.70	23.91	.00	5.13	9.48	.00	.00	5.44	5.28
7TH IN	8 .07	.00	.00	5.13	9.48	.00	.00	5.44	5.28
5TH IN	100.00	.00	3.49	3.83	7.08	.00	.00	4.06	3.94
327TH I	37.34	.00	.00	5.43	100.00	.00	.16	5.75	5.59
187TH I	24.89	.00	.00	3.62	67.82	.00	.08	3.84	3.73
502D IN	37.34	.00	.00	5.43	100.00	.00	.05	5.75	5.59
2'D IN	26.97	.00	.00	4.09	17.63	.00	.61	3.27	3.69
1ST IN	26.97	.00	.00	4.09	33.56	.00	.03	4.33	4.21
9TH IN	33.05	.00	.00	4.09	17.63	.00	.61	3.27	3.69
17TH IN	33. 5	.00	.00	4.09	17.63	.00	.61	3.27	3.69
2D IN	26.97	.00	.00	4.09	33.22	.00	.05	4.33	4.21
21ST IN	33.05	.00	.00	4.09	33.22	.00	.05	4.33	4.21

Table D-9. Distribution Summary by Location Percentage, Grade E5, MOS 11B, FY 86

REGIMENT	CONUS				OCONUS				TOTAL
	HOME BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	
41ST IN	53.98	.00	1.06	6.29	11.19	.00	.00	6.79	6.51
18TH IN	27.93	4.38	.87	5.37	31.79	22.47	.00	4.22	4.81
10TH IN	100.00	.00	.93	5.43	9.67	.00	.00	5.82	5.62
5TH CAV	46.02	.00	.00	4.55	22.58	.00	.00	2.53	3.57
8TH IN	50.00	.00	.88	5.43	9.67	.00	.00	5.82	5.62
1.TH IN	50.00	.00	.88	5.43	9.67	.00	.00	5.82	5.62
6TH IN	67.09	.00	.86	5.43	9.67	.00	.00	5.82	5.62
5TH IN	32.91	20.83	.00	4.90	8.24	.00	.00	4.96	4.93
4TH IN	66.67	.00	1.06	6.38	12.94	.00	.00	7.79	7.07
35TH IN	33.33	25.00	.77	6.29	11.19	.00	.00	6.74	6.51
7TH IN	7.10	.00	.00	5.43	9.67	.00	.00	5.82	5.62
5TH IN	100.00	.00	2.73	3.13	7.98	.00	.00	4.80	3.99
327TH I	31.43	.00	.00	4.98	98.37	.00	.00	5.54	5.26
187TH I	21.96	.00	.00	3.32	68.21	.00	.01	3.78	3.50
502D IN	36.67	.00	.00	5.81	99.97	.00	.00	5.62	5.72
2ND IN	25.00	.00	.00	3.38	15.89	.00	.00	1.97	2.70
1ST IN	28.74	.00	.00	3.89	33.33	.00	.11	4.19	4.03
9TH IN	31.18	.00	.00	3.38	15.89	.00	.00	1.97	2.70
17TH IN	31.18	.00	.00	3.38	15.89	.00	.00	1.97	2.70
2D IN	28.74	.00	.00	3.89	33.33	.00	.10	4.13	4.00
21ST IN	35.84	.00	.00	3.89	33.33	.00	.07	4.02	3.95

Table D-10. Distribution Summary by Location Percentage, Grade E6, MOS 11B, FY 86

REGIMENT	CONUS				OCONUS				
	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	54.08	.00	2.40	4.99	10.21	.00	.05	5.56	5.16
14TH IN	32.35	2.49	.70	6.65	22.36	19.68	.00	4.33	5.95
16TH IN	100.00	.00	3.23	5.33	10.21	.00	.21	6.28	5.82
51H CAV	95.92	.00	1.92	4.12	14.96	.00	.05	2.29	3.57
8TH IN	50.00	.00	3.22	4.99	10.21	.00	.05	5.56	5.16
12TH IN	50.00	.00	3.22	4.99	10.21	.00	.05	5.56	5.16
6TH IN	66.67	.00	3.19	4.99	10.21	.00	.05	5.56	5.16
52D IN	33.33	25.00	2.90	4.71	8.19	.00	.22	5.42	4.93
4TH IN	66.67	.00	3.99	5.72	12.03	.00	.10	6.74	6.03
15TH IN	33.33	21.01	.00	6.58	10.21	.00	.22	6.34	6.51
7TH IN	30.03	.00	.00	5.53	10.21	.00	.11	5.83	5.62
5TH IN	4.96	.00	3.70	3.74	8.10	.00	.04	4.41	3.94
327TH I	35.36	.00	2.31	4.99	68.60	.00	.00	5.87	5.26
187TH I	25.00	.00	2.32	4.15	59.43	.00	.00	4.88	4.38
502D IN	39.64	.00	4.64	7.48	99.95	.00	.12	7.24	7.40
23D IN	26.95	.00	1.46	3.22	12.45	.00	.00	1.58	2.72
1ST IN	31.50	.00	1.78	3.83	33.28	.00	.09	4.51	4.03
9TH IN	32.34	.00	1.71	3.22	12.45	.00	.00	1.58	2.72
17TH IN	32.34	.00	1.71	3.22	12.45	.00	.00	1.58	2.72
2D IN	31.50	.00	1.75	3.80	33.43	.00	.09	4.47	4.00
21ST IN	35.31	.00	2.11	3.75	33.28	.00	.08	4.41	3.95

Table D-11. Distribution Summary by Location Percentage, Grade E7, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	55.73	.30	3.28	4.92	11.24	.00	.00	5.86	5.16
14TH IN	33.53	2.15	.00	6.57	16.05	19.11	.00	4.15	5.95
16TH IN	100.00	.00	2.72	5.36	12.25	.00	.00	6.39	5.62
5TH CAV	44.27	.00	1.95	4.04	13.68	.00	.02	2.19	3.57
8TH IN	56.00	.00	3.63	5.12	8.99	.00	.06	5.28	5.16
12TH IN	56.00	.00	3.43	4.92	11.24	.00	.00	5.86	5.16
6TH IN	66.67	.00	3.51	5.15	8.63	.00	.06	5.19	5.16
52D IN	33.33	25.00	2.84	4.69	10.73	.00	.00	5.60	4.93
4TH IN	66.67	.00	4.15	5.75	13.14	.00	.00	6.85	6.03
15TH IN	33.33	20.52	.00	6.70	8.63	.00	.14	5.95	6.51
7TH IN	31.11	.00	.00	5.68	8.63	.00	.09	5.45	5.62
5TH IN	7.58	.00	3.65	3.76	6.53	.00	.10	4.48	3.94
327TH I	33.89	.00	3.57	5.01	79.43	.00	.00	5.97	5.26
187TH I	25.00	.00	3.13	4.17	52.24	.00	.00	4.97	4.38
5F2D IN	41.11	.00	5.97	7.63	100.00	.00	.13	6.74	7.40
23D IN	26.85	.00	1.74	3.04	9.44	.00	.03	1.81	2.72
1ST IN	32.30	.00	2.29	3.84	29.93	.00	.06	4.59	4.03
9TH IN	31.91	.00	1.95	3.04	9.40	.00	.03	1.81	2.72
17TH IN	31.91	.00	1.95	3.04	9.40	.00	.03	1.81	2.72
3D IN	32.30	.30	2.26	3.82	30.28	.00	.06	4.65	4.00
21ST IN	36.19	.00	2.54	3.76	39.79	.00	.00	4.49	3.95

Table D-12. Distribution Summary by Location Percentage, Grade E8, Mos 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	63.99	.00	2.28	4.91	11.43	.00	.00	5.75	5.16
18TH IN	96.89	1.67	.00	6.35	34.14	14.33	.00	5.00	5.95
101H IN	87.73	.00	.00	6.02	5.95	.00	.10	0.68	5.62
5TH CAV	36.71	.00	2.56	3.99	12.31	.00	.03	2.57	3.57
8TH IN	50.00	.00	3.06	4.91	11.43	.00	.00	5.75	5.16
12TH IN	50.00	.00	3.06	4.91	11.43	.00	.00	5.75	5.16
6TH IN	64.82	.00	2.96	4.91	11.43	.00	.00	5.75	5.16
82D IN	35.18	25.00	2.75	4.69	10.91	.00	.00	5.49	4.93
4TH IN	67.59	.00	3.73	5.74	13.36	.00	.00	6.72	6.03
15TH IN	32.41	16.79	.00	6.43	17.16	.00	.03	6.70	6.51
7TH IN	98.00	.00	.00	6.02	5.95	.00	.10	0.68	5.62
5TH IN	22.22	.00	3.49	3.76	5.95	.00	.08	0.39	3.95
327TH I	26.25	.00	3.57	5.00	51.42	.00	.00	5.86	5.26
187TH I	20.26	.00	3.08	4.17	51.12	.00	.00	4.87	4.38
502D IN	53.49	.00	0.35	7.45	100.00	.00	.07	7.29	7.40
23D IN	16.20	.00	2.11	3.11	10.77	.00	.02	1.81	2.72
3ST IN	50.05	.00	.00	3.84	36.43	.00	.00	0.49	0.03
9TH IN	23.15	.00	2.06	3.11	10.77	.00	.02	1.81	2.72
17TH IN	95.99	.00	.07	3.11	10.77	.00	.02	1.81	2.72
2D IN	23.08	.00	2.34	3.81	36.15	.00	.00	0.46	0.00
21ST IN	30.87	.00	2.34	3.76	27.42	.00	.03	0.48	3.95

(NOT USED)

Section IV. DISTRIBUTION AS A PERCENTAGE OF THE TOTAL POPULATION

The tables in this section illustrate the reports which express the Section II distributions by percentage of the total population.

Table D-13. Distribution Summary by System Percentage, Grade E3, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	1.53	.00	.09	1.62	1.64	.00	.00	1.64	3.26
16TH IN	.15	1.92	1.07	2.25	1.30	.66	.00	1.96	4.20
14TH IN	1.59	.00	.00	1.59	1.61	.00	.00	1.61	3.20
5TH CAV	1.51	.00	.00	1.51	.76	.00	.40	1.16	2.67
8TH IN	1.54	.00	.00	1.54	1.51	.00	.05	1.57	3.11
1.7TH IN	1.60	.00	.00	1.60	1.58	.00	.04	1.62	3.22
6TH IN	1.56	.00	.00	1.56	1.59	.00	.00	1.59	3.15
52D IN	.76	1.67	.00	2.42	2.46	.00	.00	2.46	4.89
4TH IN	1.54	.00	2.45	3.99	4.05	.00	.00	4.05	8.04
15TH IN	.76	.76	.00	1.51	1.54	.00	.00	1.54	3.05
7TH IN	1.61	.00	.00	1.61	1.64	.00	.00	1.64	3.25
5TH IN	.19	.00	2.02	2.21	2.25	.00	.00	2.25	4.46
327TH I	5.53	.00	.00	5.53	4.88	.00	.49	5.37	10.89
187TH I	3.68	.00	.00	3.68	3.74	.00	.00	3.74	7.43
5C2D IN	5.53	.00	.00	5.53	5.55	.00	.06	5.61	11.14
23D IN	2.14	.00	.00	2.14	1.27	.00	.27	1.54	3.69
1ST IN	2.14	.00	.00	2.14	2.18	.00	.00	2.18	4.32
9TH IN	2.14	.00	.00	2.14	1.27	.00	.27	1.54	3.69
17TH IN	2.14	.00	.00	2.14	1.27	.00	.27	1.54	3.69
2D IN	2.14	.00	.00	2.14	2.18	.00	.00	2.18	4.32
21ST IN	2.14	.00	.00	2.14	2.18	.00	.00	2.18	4.32

Table D-14. Distribution Summary by System Percentage, Grade E4, MOS 11B, FY 86

REGIMENT	CONUS				OCONUS				
	MAIN-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	2.61	.00	.00	2.61	2.67	.00	.00	2.67	5.28
18TH IN	.65	1.47	.14	2.27	.86	1.12	.00	1.97	4.24
16TH IN	2.61	.00	.00	2.61	2.63	.00	.02	2.66	5.27
5TH CAV	2.61	.00	.00	2.61	1.64	.00	.00	1.64	4.25
8TH IN	2.61	.00	.00	2.61	2.67	.00	.00	2.67	5.28
12TH IN	2.61	.00	.00	2.61	2.67	.00	.00	2.67	5.28
6TH IN	2.61	.00	.00	2.61	2.67	.00	.00	2.67	5.28
52D IN	1.31	1.11	.00	2.42	2.47	.00	.00	2.47	4.89
4TH IN	2.69	.00	.84	3.52	3.60	.00	.00	3.60	7.13
15TH IN	1.31	1.31	.00	2.62	2.67	.00	.00	2.67	5.28
7TH IN	2.61	.00	.00	2.61	2.67	.00	.00	2.67	5.28
5TH IN	.18	.00	1.77	1.95	1.99	.00	.00	1.99	3.94
327TH I	2.76	.00	.00	2.76	2.67	.00	.15	2.83	5.59
187TH I	1.84	.00	.00	1.84	1.80	.00	.08	1.88	3.73
502D IN	2.76	.00	.00	2.76	2.77	.00	.05	2.83	5.59
23D IN	2.08	.00	.00	2.08	1.04	.00	.57	1.61	3.69
1ST IN	2.08	.00	.00	2.08	2.10	.00	.02	2.13	4.21
9TH IN	2.08	.00	.00	2.08	1.04	.00	.57	1.61	3.69
17TH IN	2.08	.00	.00	2.08	1.04	.00	.57	1.61	3.69
2D IN	2.08	.00	.00	2.08	2.08	.00	.05	2.13	4.21
21ST IN	2.08	.00	.00	2.08	2.08	.00	.05	2.13	4.21

Table D-15. Distribution Summary by System Percentage, Grade E5, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	2.79	.00	.49	3.23	3.28	.00	.00	3.28	6.51
18TH IN	1.19	1.22	.35	2.76	.82	1.23	.00	2.05	4.81
16TH IN	2.34	.00	.46	2.79	2.83	.00	.00	2.83	5.62
5TH CAV	2.34	.00	.00	2.34	1.23	.00	.00	1.23	3.57
8TH IN	2.34	.00	.41	2.79	2.83	.00	.00	2.83	5.62
1.TH IN	2.38	.00	.41	2.79	2.83	.00	.00	2.83	5.62
6TH IN	2.38	.00	.41	2.79	2.83	.00	.00	2.83	5.62
52D IN	1.17	1.35	.00	2.52	2.41	.00	.00	2.41	4.93
4TH IN	2.77	.00	.51	3.28	3.79	.00	.00	3.79	7.07
15TH IN	1.38	1.50	.35	3.23	3.28	.00	.00	3.28	6.51
7TH IN	2.79	.00	.00	2.79	2.83	.00	.00	2.83	5.62
5TH IN	.21	.00	1.40	1.61	2.34	.00	.00	2.34	3.94
327TH I	2.56	.00	.00	2.56	2.70	.00	.00	2.70	5.26
187TH I	1.71	.00	.00	1.71	1.77	.00	.03	1.80	3.50
5(2D IN	2.99	.00	.00	2.99	2.63	.00	.10	2.73	5.72
23D IN	1.79	.00	.00	1.79	.87	.00	.09	.96	2.70
1ST IN	2.00	.00	.00	2.00	1.76	.00	.28	2.04	4.03
9TH IN	1.79	.00	.00	1.79	.87	.00	.09	.96	2.70
17TH IN	1.79	.00	.00	1.79	.87	.00	.09	.96	2.70
2D IN	2.00	.00	.00	2.00	1.76	.00	.25	2.01	4.00
21ST IN	2.00	.00	.00	2.00	1.76	.00	.19	1.95	3.95

Table D-16. Distribution Summary by System Percentage, Grade E6 MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	1.89	.00	1.59	3.48	1.62	.00	.07	1.68	5.16
18TH IN	4.16	.48	.00	4.63	.56	.76	.00	1.31	5.95
16TH IN	1.51	.00	2.21	3.72	1.62	.00	.29	1.90	5.62
5TH CAV	1.09	.00	1.27	2.87	.56	.00	.14	.69	3.57
8TH IN	1.31	.00	2.16	3.48	1.62	.00	.07	1.68	5.16
14TH IN	1.31	.00	2.16	3.48	1.62	.00	.07	1.68	5.16
6TH IN	1.32	.00	2.16	3.48	1.62	.00	.07	1.68	5.16
52D IN	.66	.68	1.95	3.29	1.33	.00	.31	1.64	4.93
4TH IN	1.29	.00	2.70	3.99	1.90	.00	.14	2.04	6.03
15TH IN	.64	3.94	.00	4.59	1.62	.00	.30	1.92	6.51
7TH IN	3.86	.00	.00	3.86	1.62	.00	.15	1.77	5.62
5TH IN	.11	.00	2.50	2.61	1.28	.00	.05	1.34	3.94
327TH I	2.60	.00	1.48	3.48	1.78	.00	.00	1.78	5.26
187TH I	1.41	.00	1.48	2.90	1.48	.00	.00	1.48	4.38
502D IN	2.24	.00	2.97	5.21	1.85	.00	.34	2.19	7.40
23D IN	1.29	.00	.95	2.24	.48	.00	.00	.48	2.72
1ST IN	1.51	.00	1.15	2.67	1.12	.00	.25	1.37	4.03
9TH IN	1.11	.00	1.13	2.24	.48	.00	.00	.48	2.72
17TH IN	1.11	.00	1.13	2.24	.48	.00	.00	.48	2.72
2D IN	1.51	.00	1.13	2.65	1.13	.00	.23	1.36	4.00
21ST IN	1.22	.00	1.40	2.61	1.12	.00	.22	1.34	3.95

Table D-17. Distribution Summary by System Percentage, Grade E7, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	2.05	.00	1.61	3.66	1.50	.00	.00	1.50	5.16
18TH IN	4.55	.33	.10	4.89	.39	.67	.00	1.06	5.95
187TH IN	2.02	.00	1.97	3.98	1.64	.00	.00	1.64	5.62
5TH CAV	1.63	.00	1.78	3.01	.48	.00	.08	.56	3.57
8TH IN	1.19	.00	2.62	3.81	1.20	.00	.15	1.35	5.16
12TH IN	1.19	.00	2.47	3.66	1.50	.00	.00	1.50	5.16
6TH IN	1.28	.00	2.55	3.83	1.15	.00	.17	1.33	5.16
520 IN	.69	.81	2.14	3.49	1.43	.00	.00	1.43	4.93
4TH IN	1.26	.00	3.01	4.26	1.76	.00	.00	1.76	6.03
15TH IN	.63	4.35	.10	4.98	1.15	.00	.37	1.53	6.51
7TH IN	4.23	.00	.00	4.23	1.15	.00	.24	1.40	5.62
5TH IN	.15	.00	2.65	2.80	.87	.00	.28	1.15	3.94
327TH I	1.19	.00	2.53	3.73	1.53	.00	.00	1.53	5.26
187TH I	.88	.00	2.22	3.10	1.27	.00	.00	1.27	4.38
502D IN	1.45	.00	4.23	5.68	.99	.00	.73	1.73	7.40
2ND IN	1.03	.00	1.23	2.26	.33	.00	.13	.46	2.72
1ST IN	1.25	.00	1.61	2.86	.87	.00	.31	1.17	4.03
9TH IN	.86	.00	1.39	2.26	.33	.00	.13	.46	2.72
17TH IN	.86	.00	1.39	2.26	.33	.00	.13	.46	2.72
2D IN	1.25	.00	1.59	2.84	.88	.00	.29	1.17	4.00
21ST IN	.98	.00	1.82	2.80	1.15	.00	.00	1.15	3.95

Table D-18. Distribution Summary by System Percentage, Grade E8, MOS 11B, FY 86

	CONUS				OCONUS				
REGIMENT	HOME-BASE	ALTERNATE BASE	CONUS OTHER	TOTAL CONUS	ASSIGNED AREA 1	ASSIGNED AREA 2	OTHER AREAS	TOTAL OCONUS	TOTAL
41ST IN	1.92	.00	1.54	3.45	1.71	.00	.00	1.71	5.16
18TH IN	4.13	.33	.00	4.47	.97	.52	.00	1.48	5.95
16TH IN	4.23	.00	.00	4.23	.89	.00	.50	1.39	5.62
5TH CAV	1.08	.00	1.72	2.80	.44	.00	.32	.76	3.57
8TH IN	1.39	.00	2.07	3.45	1.71	.00	.00	1.71	5.16
12TH IN	1.39	.00	2.07	3.45	1.71	.00	.00	1.71	5.16
6TH IN	1.44	.00	2.02	3.45	1.71	.00	.00	1.71	5.16
520 IN	.78	.67	1.85	3.30	1.63	.00	.00	1.63	4.93
4TH IN	1.50	.00	2.54	4.04	1.99	.00	.00	1.99	6.03
15TH IN	.72	3.80	.00	4.52	1.81	.00	.17	1.99	6.51
7TH IN	4.23	.00	.00	4.23	.89	.00	.50	1.39	5.62
5TH IN	.22	.00	2.42	2.64	.89	.00	.42	1.30	3.95
327TH I	1.16	.00	2.35	3.52	1.74	.00	.00	1.74	5.26
187TH I	.90	.00	2.03	2.93	1.45	.00	.00	1.45	4.38
5G20 IN	2.37	.00	2.87	5.24	1.50	.00	.66	2.16	7.40
230 IN	.81	.00	1.38	2.19	.39	.00	.15	.54	2.72
1ST IN	2.70	.00	.00	2.70	1.33	.00	.00	1.33	4.03
9TH IN	.81	.00	1.38	2.19	.39	.00	.15	.54	2.72
17TH IN	1.61	.00	.58	2.19	.39	.00	.15	.54	2.72
20 IN	1.15	.00	1.53	2.68	1.32	.00	.00	1.32	4.00
21ST IN	1.08	.00	1.57	2.64	1.00	.00	.30	1.31	3.95

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@HOME;FREE 1G.

@ASG,A S%CPOUT-11C6.

@FREE 20.

@USE 20,S%CPOUT-11C6

@ASG,A L711CLPDATA3.

@USE 10.,L711CLPDATA3.
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CAA	UNIT REPLACEMENT SYSTEM ANALYSIS III (URSA III)	ONE SHEET STUDY GIST

THE PRINCIPAL FINDINGS of the work reported herein are as follows:

(1) Personnel assets can be distributed to regiments so that differences in CONUS turnaround time and promotion opportunity are minimal. Differences between regiments in homebasing for individuals, opportunity to serve in TOE units, and short-tour equity will be substantial.

(2) The proposed company replacement cycles will have the effect of increasing personnel turbulence in TDA activities and TOE units above company level. Associated with this increase in turbulence is an increase in the number of annual PCS moves required.

(3) Individual soldiers will tend to PCS more frequently under the proposed system than under the current system.

(4) The regimental and unit replacement system will constrain force design, stationing, structuring, and manning decisions.

THE MAIN ASSUMPTIONS on which the work reported herein rests are as follows:

(1) The linking and pairing of units will be as briefed by ODCSOPS and approved by CSA.

(2) The authorization data provided by the proponent is accurate. The Army will be manned to that authorization.

(3) The system is operating in a steady-state, peacetime condition and will not be subjected to major dislocations such as restationing of units and unit activations or inactivations.

THE PRINCIPAL LIMITATIONS of this work which may affect the findings are as follows:

(1) The study did not address questions concerning the effect of the regimental and unit replacment system on the cohesion, readiness, or capability of the units involved.

(2) Only high density combat arms MOSs were considered; questions concerning combat support and combat service support personnel were not addressed.

(3) The methodology employed was deterministic and ignores many manning functions and interactions; for example, transitioning between primary and secondary MOSs was not considered.

(4) Airborne regiments were not included in the analysis because of their unique requirements and geographic distribution.

THE SCOPE OF THE STUDY The study included proposed infantry, armor, and field artillery regiments with personnel allocations developed using FY 83 and FY 86 authorization data.

THE STUDY OBJECTIVES were to:

(1) Develop a methodology to distribute spaces to regiments to best meet goals of equitable career opportunity.

(2) Analyze the resulting allocation for impact of regimental structure and unit replacement plan on individual soldiers, impact of structure and unit replacement on units and activities, and identify costs and potential problem areas.

THE BASIC APPROACH followed in this study was to formulate and prioritize goals. Then a sequential linear goal programing model was developed to distribute personnel spaces to best meet the prioritized goals. This allocation was then analyzed to determine system and individual effects.

THE REASON FOR PERFORMING THE STUDY was to assist in the transition from the current individual replacement system to a regimental system with unit replacement.

THE STUDY SPONSOR was the Manning Task Force, ODCSPER.

THE STUDY EFFORT was directed by MAJ C. B. Torres, Force Systems Directorate.

COMMENTS AND QUESTIONS may be directed to CAA, ATTN: Assistant Director for Force Systems (CSCA-FS).

Tear-out copies of this synopsis are at back cover.

CAA	UNIT REPLACEMENT SYSTEM ANALYSIS III (URSA III)	ONE SHEET STUDY GIST

THE PRINCIPAL FINDINGS of the work reported herein are as follows:

(1) Personnel assets can be distributed to regiments so that differences in CONUS turnaround time and promotion opportunity are minimal. Differences between regiments in homebasing for individuals, opportunity to serve in TOE units, and short-tour equity will be substantial.

(2) The proposed company replacement cycles will have the effect of increasing personnel turbulence in TDA activities and TOE units above company level. Associated with this increase in turbulence is an increase in the number of annual PCS moves required.

(3) Individual soldiers will tend to PCS more frequently under the proposed system than under the current system.

(4) The regimental and unit replacement system will constrain force design, stationing, structuring, and manning decisions.

THE MAIN ASSUMPTIONS on which the work reported herein rests are as follows:

(1) The linking and pairing of units will be as briefed by ODCSOPS and approved by CSA.

(2) The authorization data provided by the proponent is accurate. The Army will be manned to that authorization.

(3) The system is operating in a steady-state, peacetime condition and will not be subjected to major dislocations such as restationing of units and unit activations or inactivations.

THE PRINCIPAL LIMITATIONS of this work which may affect the findings are as follows:

(1) The study did not address questions concerning the effect of the regimental and unit replacment system on the cohesion, readiness, or capability of the units involved.

(2) Only high density combat arms MOSs were considered; questions concerning combat support and combat service support personnel were not addressed.

(3) The methodology employed was deterministic and ignores many manning functions and interactions; for example, transitioning between primary and secondary MOSs was not considered.

(4) Airborne regiments were not included in the analysis because of their unique requirements and geographic distribution.

THE SCOPE OF THE STUDY The study included proposed infantry, armor, and field artillery regiments with personnel allocations developed using FY 83 and FY 86 authorization data.

THE STUDY OBJECTIVES were to:

(1) Develop a methodology to distribute spaces to regiments to best meet goals of equitable career opportunity.

(2) Analyze the resulting allocation for impact of regimental structure and unit replacement plan on individual soldiers, impact of structure and unit replacement on units and activities, and identify costs and potential problem areas.

THE BASIC APPROACH followed in this study was to formulate and prioritize goals. Then a sequential linear goal programing model was developed to distribute personnel spaces to best meet the prioritized goals. This allocation was then analyzed to determine system and individual effects.

THE REASON FOR PERFORMING THE STUDY was to assist in the transition from the current individual replacement system to a regimental system with unit replacement.

THE STUDY SPONSOR was the Manning Task Force, ODCSPER.

THE STUDY EFFORT was directed by MAJ C. B. Torres, Force Systems Directorate.

COMMENTS AND QUESTIONS may be directed to CAA, ATTN: Assistant Director for Force Systems (CSCA-FS).

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CAA	UNIT REPLACEMENT SYSTEM ANALYSIS III (URSA III)	ONE SHEET STUDY GIST

THE PRINCIPAL FINDINGS of the work reported herein are as follows:

(1) Personnel assets can be distributed to regiments so that differences in CONUS turnaround time and promotion opportunity are minimal. Differences between regiments in homebasing for individuals, opportunity to serve in TOE units, and short-tour equity will be substantial.

(2) The proposed company replacement cycles will have the effect of increasing personnel turbulence in TDA activities and TOE units above company level. Associated with this increase in turbulence is an increase in the number of annual PCS moves required.

(3) Individual soldiers will tend to PCS more frequently under the proposed system than under the current system.

(4) The regimental and unit replacement system will constrain force design, stationing, structuring, and manning decisions.

THE MAIN ASSUMPTIONS on which the work reported herein rests are as follows:

(1) The linking and pairing of units will be as briefed by ODCSOPS and approved by CSA.

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